3Rabbitz

SM version 2.0

SmoothMoves User Manual v2

2D Skeletal animation editor for Unity3D

echo17

3Rabbitz book

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1.

Overview

Guide Version 2012.10.23.1

Figure 1-1 Rise of the Dough

SmoothMoves is a 2D skeletal animation editor. What this means is that the SmoothMoves editor can be used to create fluid animations of textures attached to a hierarchical bone structure. This gives a much more natural motion to your animations than traditional sprite animation can.

In addition to being able to animate skeletally, you can also create keyframes that switch textures. This allows you to run traditional sprite animations inside of your bone animations, giving you the flexibility to create astounding and complex animations.

This manual will help familiarize you with the SmoothMoves 2D skeletal animation editor for Unity3D. The main purpose of this manual is to explain the functionality of the editor windows. For a complete walkthrough of setting up an animation, please see the online video tutorials at:

echo17.com

1.1 System Requirements

- Windows or Mac operating system
- Unity3D: available here
- Smooth Moves package: available here

1.2 Compatibility

SmoothMoves works on the following Unity3D platforms:

- PC Standalone
- Mac Standalone
- Web Player
- iOS
- Andriod

SmoothMoves does **NOT** work on the following Unity3D platforms:

- Flash

2.

Setting Up The Unity3D Environment

2.1 Import

If you are upgrading from 1.x, please read the v2 upgrade guide first! You can find this guide at echo17.com or in the SmoothMoves plugin folder.

To install SmoothMoves:

1. Open Unity3D
2. Create a new project (or open an existing one)
3. Open the Asset Store by going to the menu Window > Asset Store
4. Search for SmoothMoves
5. Purchase by clicking on the Buy button on the left

Figure 2-1 Buy

If you have already purchased, but have not downloaded (or an update is available), you will see the download button.

Figure 2-2 Download

If you have already purchased and downloaded, you will see the import button.

Figure 2-3 Import

2.2 Folder Structure

SmoothMoves is organized into the following folders under the SmoothMoves root folder

- **Demo** - This is the result that can be reached by going through the video tutorials located at echo17.com.
- **Rise of the Dough** - This is a minigame showing how Smooth Moves can be used to create high quality 2D games.
- **SmoothMoves** - This folder contains the plugins that allow you to animate your 2D art.
- **Playmaker Scripts** - A zipped file of scripts that can be used in the Playmaker plugin.

Please do not distribute the SmoothMoves_Editor.dll file. This file is proprietary and is only valid with a purchased SmoothMoves license.

See the 9. Redistributing Your Work chapter for more information.

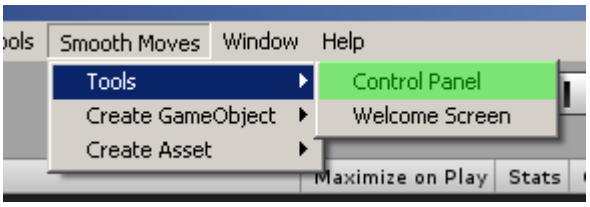
2.3 Smooth Moves Control Panel

Whenever you are using SmoothMoves, it is a good idea to have the Control Panel open to assist you with your workflow.

The Control Panel was introduced with version 2.0 and is a significant change from the workflow of the 1.x series. Using the control panel, the building and updating of animations is mostly shifted to design time, rather than runtime. This improves runtime performance and memory usage.

To open the control panel, go to the menu at the top of the Unity Editor: Smooth Moves > Tools > Control Panel.

Figure 2-4 Control Panel Open



You can also open the control panel from either a bone animation data asset or a scene bone animation instance.

Figure 2-5 Open Control Panel Asset

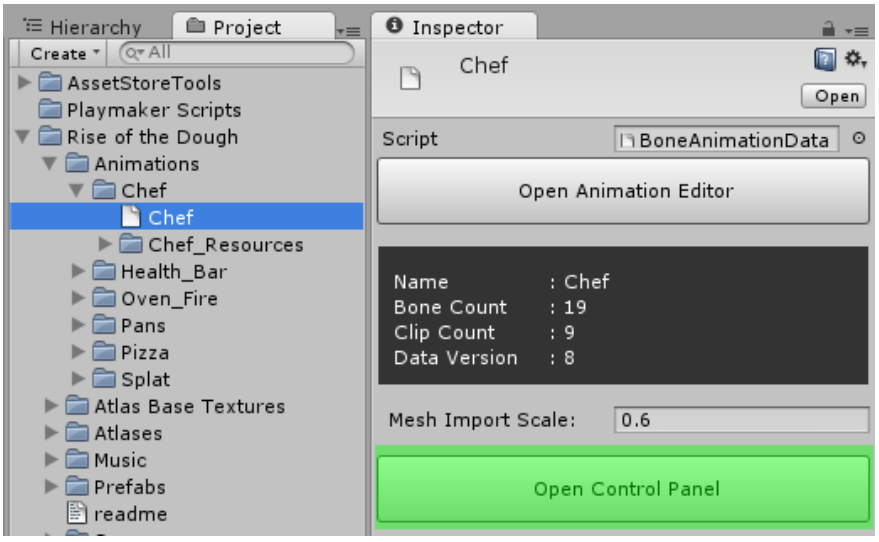


Figure 2-6 Open Control Panel Scene

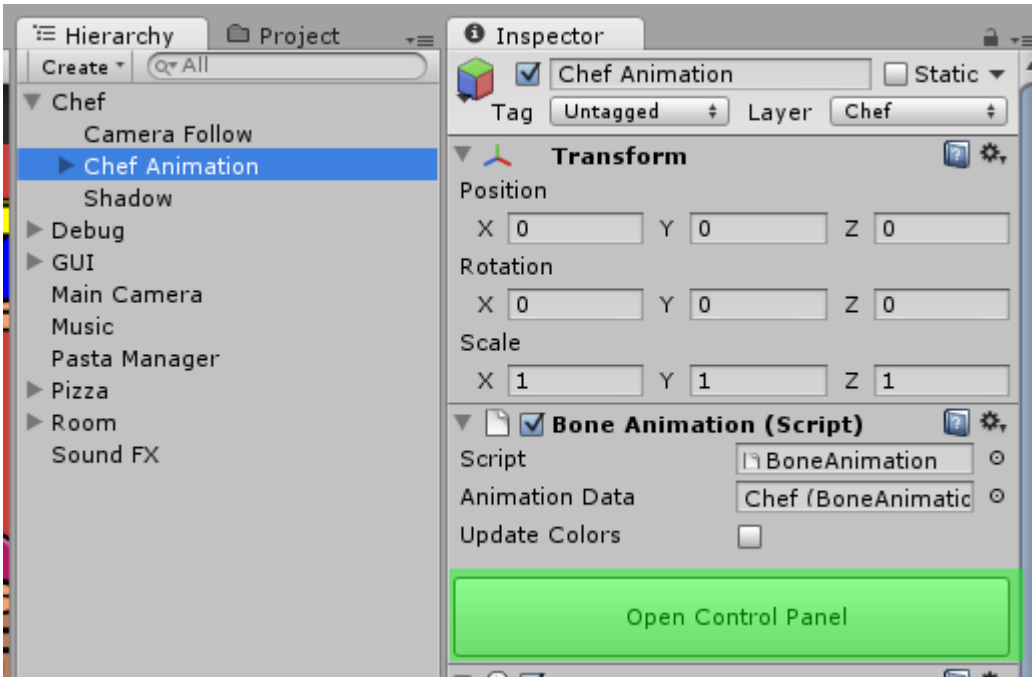
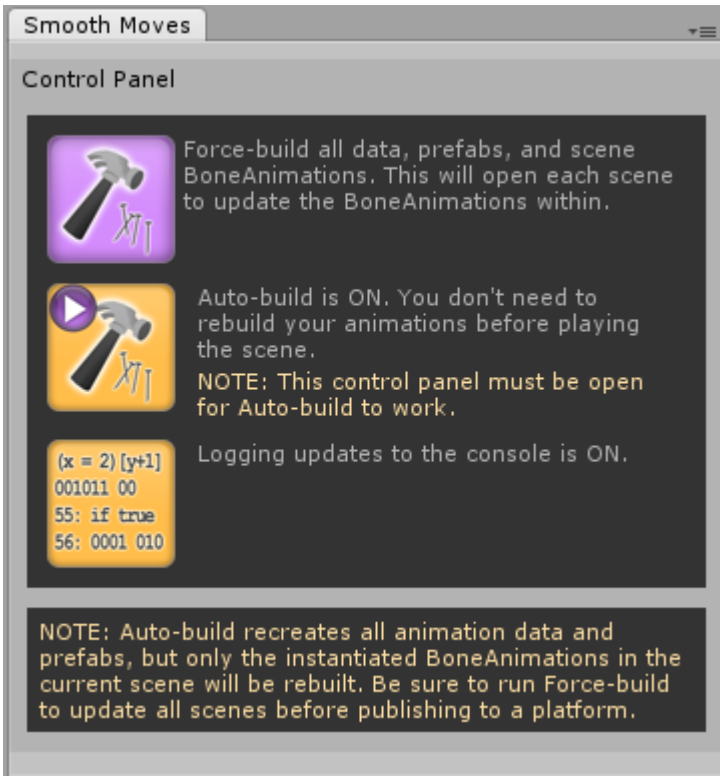


Figure 2-7 Control Panel


Smooth Moves
Control Panel
Force-build all data, prefabs, and scene BoneAnimations. This will open each scene to update the BoneAnimations within.
Auto-build is ON. You don't need to rebuild your animations before playing the scene.
NOTE: This control panel must be open for Auto-build to work.
(x = 2) [y+1]
001011 00
55: if true
56: 0001 010
Logging updates to the console is ON.
NOTE: Auto-build recreates all animation data and prefabs, but only the instantiated BoneAnimations in the current scene will be rebuilt. Be sure to run Force-build to update all scenes before publishing to a platform.

The control panel can be docked for easier access at all times.

Force Build

Clicking on force build will make SmoothMoves rebuild all your animation data, all your animation prefabs, and the animation instances in each scene. You will be prompted to save the current scene first, since SmoothMoves will need to open each scene to update them.

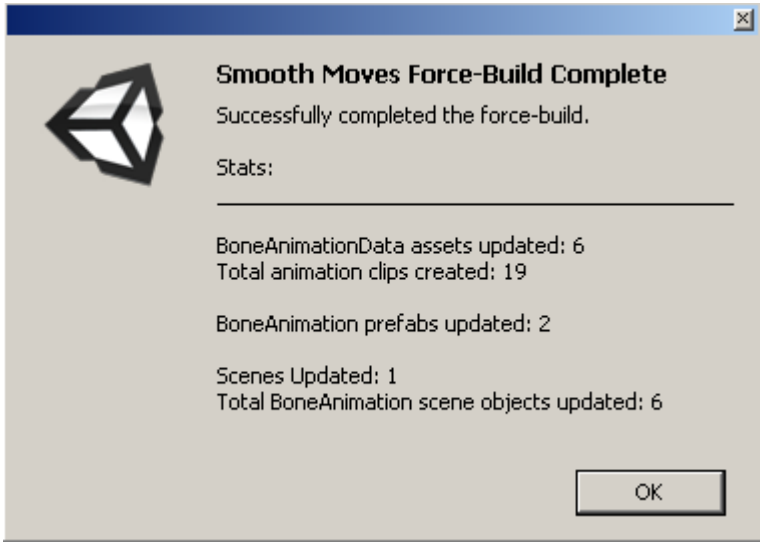
If you are upgrading a project from before 2.x, you should use force build to update all of your animations to the new format.

As your animations are being rebuilt, a progress bar will inform you of the status of the process.

Figure 2-8 Force Build Progress

When the force build is complete, you will see a window with stats that show what all was updated, breaking down the information into animation asset data, prefabs, and instantiated scene animations.

Figure 2-9 Force Build Stats



SmoothMoves cannot rebuild animations in prefabs that are not at the root level of the prefab. Unity does not allow access to child objects of prefabs without instantiating every prefab, modifying, and updating. If your project had thousands of prefabs, this would not be practical. If you need to have animations as children to another prefab, it is suggested that you make references in your parent prefab to instantiate the child animations upon creation. See below for a graphical explanation.

Figure 2-10 Good Prefab Structure

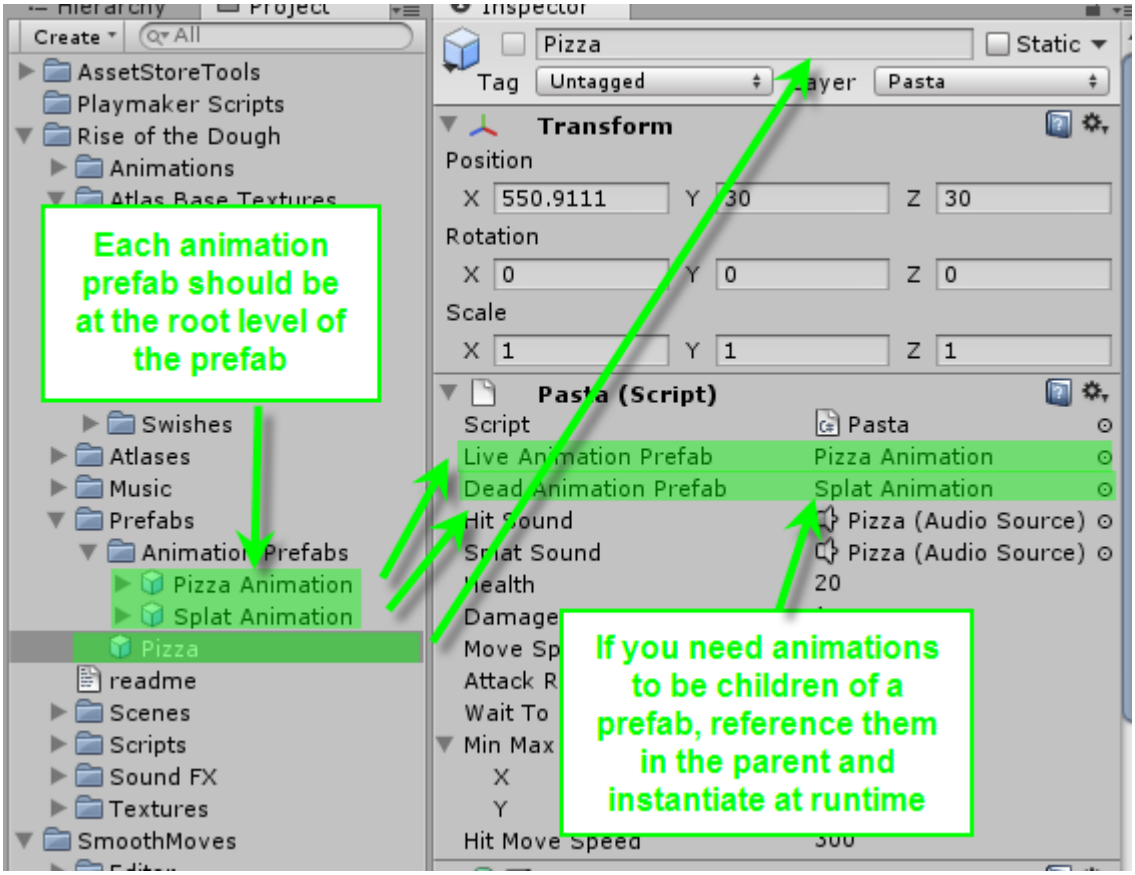
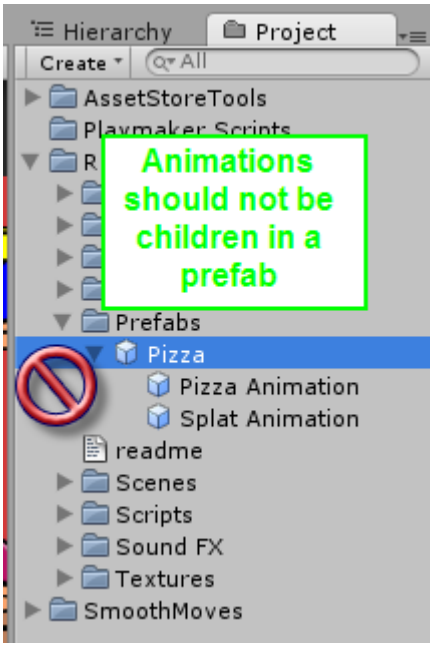


Figure 2-11 Bad Prefab Structure



Auto-Build Toggle

You can set SmoothMoves to auto-build by toggling on the Auto-Build button. This will build the animation data assets, prefabs, and the current scene's instantiated animations every time your press the Play button in the editor. Only the animations that need updating will be built to further save you time.

You must have the Control Panel open for Auto-Build to work.

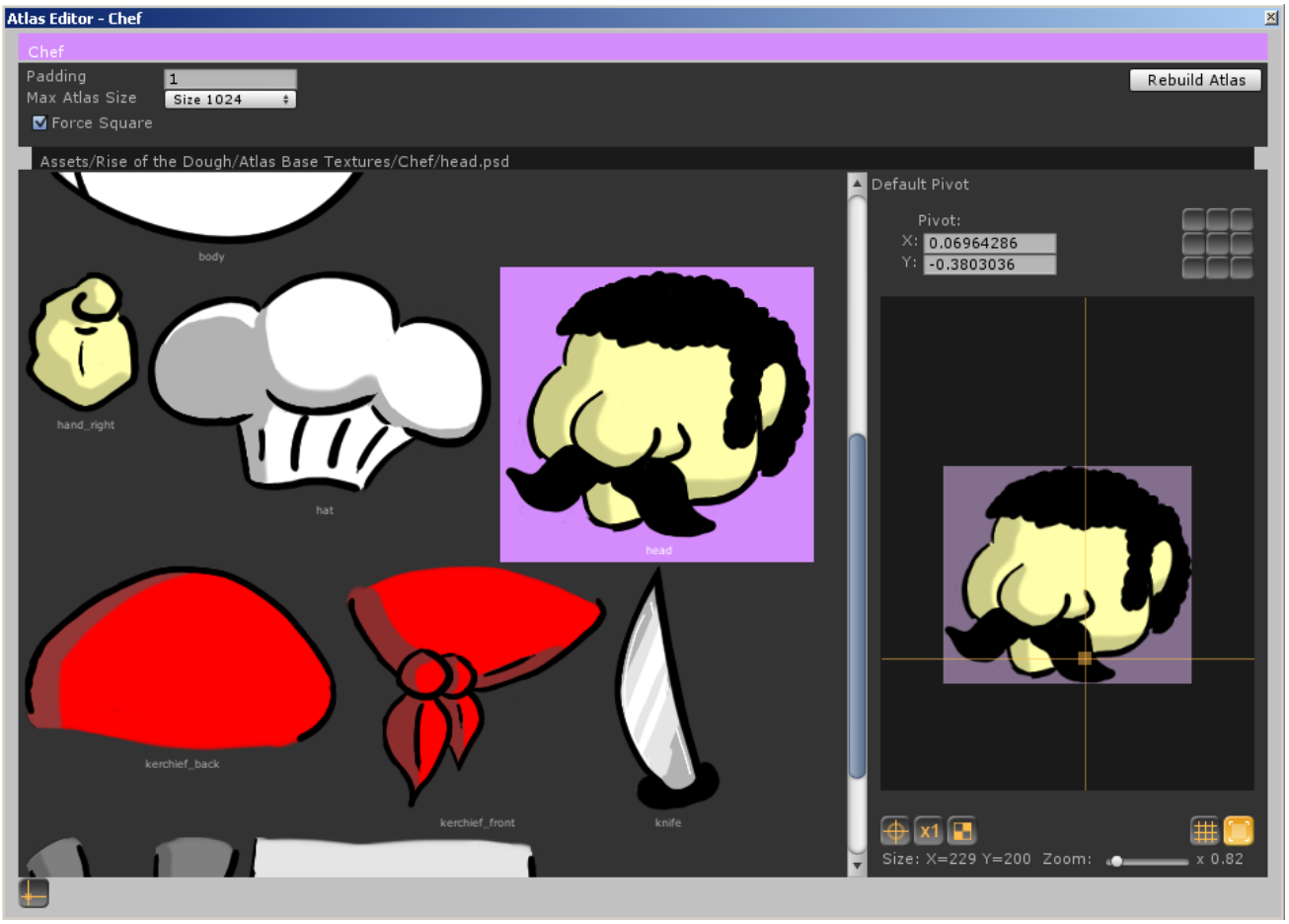
Logging Updates

When logging is set on, you will receive build information to the Unity console whenever an animation is rebuilt. This can help you determine what assets have been changed.

3.

Atlas Editor

Figure 3-1 Atlas Editor



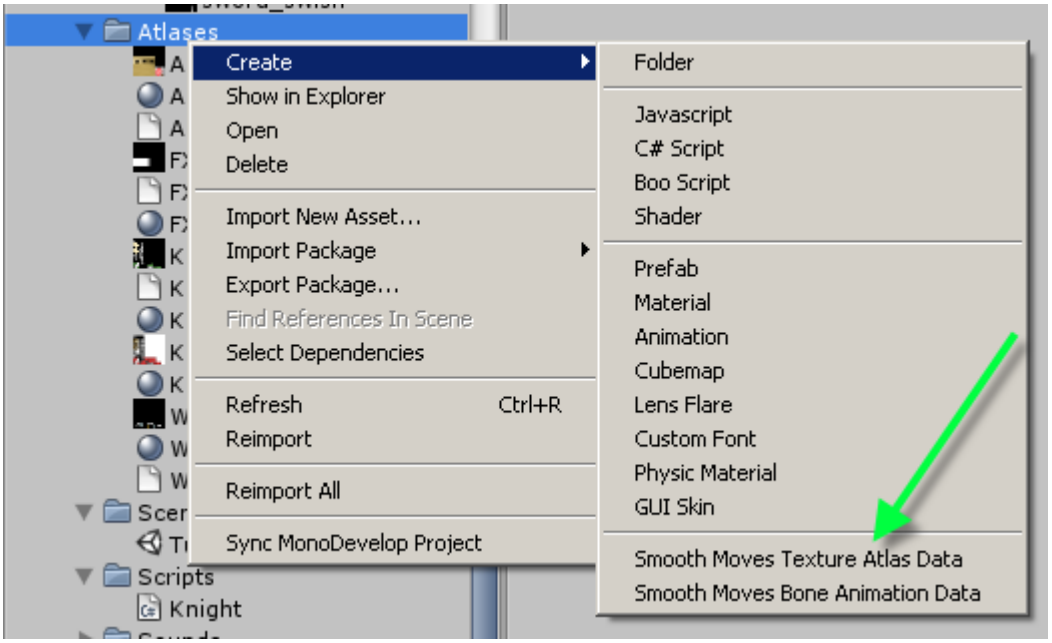
3.1 Overview

The atlas editor allows you to group the textures that comprise your animation into a single texture sheet, also known as a texture atlas. The editor lets you add and remove textures, set default pivot points for your textures to rotate and scale around, set the overall atlas size, atlas padding, and optionally force your atlas to be square (same length and width) for mobile device compression.

3.2 Create an Atlas

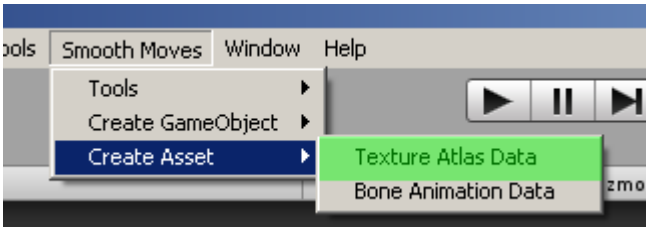
To create an atlas, you right click on the folder in your Project panel, select Create > SmoothMoves Texture Atlas Data .

Figure 3-2 Create Atlas Asset



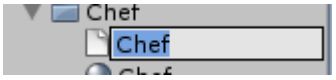
You can also create an atlas asset from the Unity menu at the top by going to SmoothMoves > Create Asset > Texture Atlas Data.

Figure 3-3 Create Atlas From Menu



Be sure to change the name of your new atlas data at this time. The material and texture files that the atlas editor creates will match the name of the atlas data that you specify here.

Figure 3-4 Rename Atlas Data



Input

The atlas editor allows you to drop source textures that you create in an external program, such as photoshop. Each of these textures will be what the bones of your animation will display.

Output

The atlas editor will output three files

- Atlas Data
- Material
- Texture

The atlas data file will contain all the necessary information for SmoothMoves to do its magic. The material file tells Unity how to render the texture file. You can set the shader of the material for different effects such as transparency, glow, etc. The texture file is the actual texture atlas which will contain all your source textures packed into a single file.

3.3 Atlas Settings

Figure 3-5 Atlas Settings

Padding

This is the amount of pixels between each of your source textures in the final atlas texture. More padding allows you to have higher compression without "bleeding" of color into other textures.

Figure 3-6 Texture - Low Padding (1 pixel)

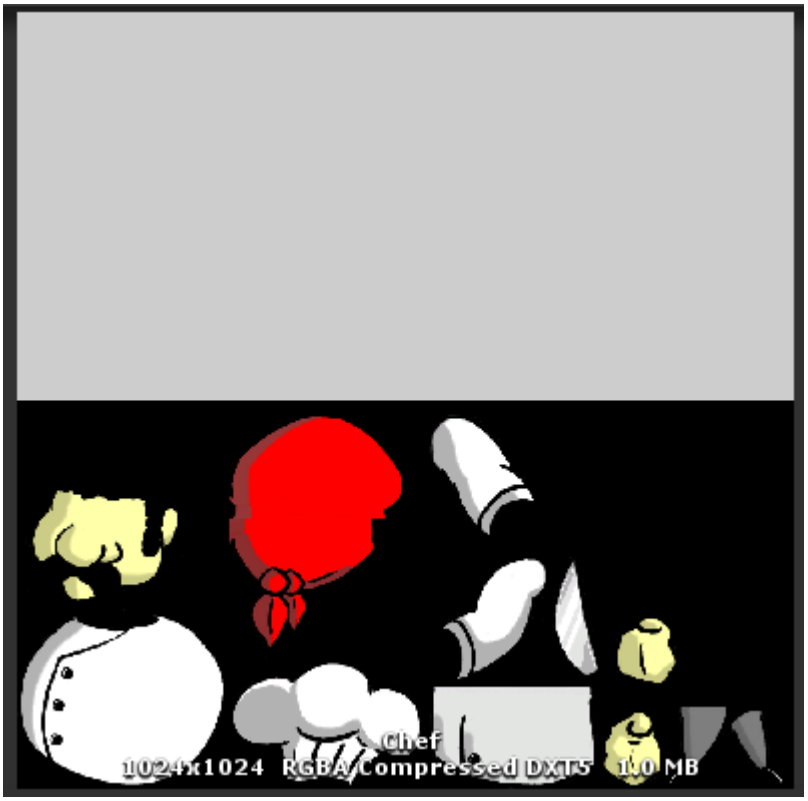
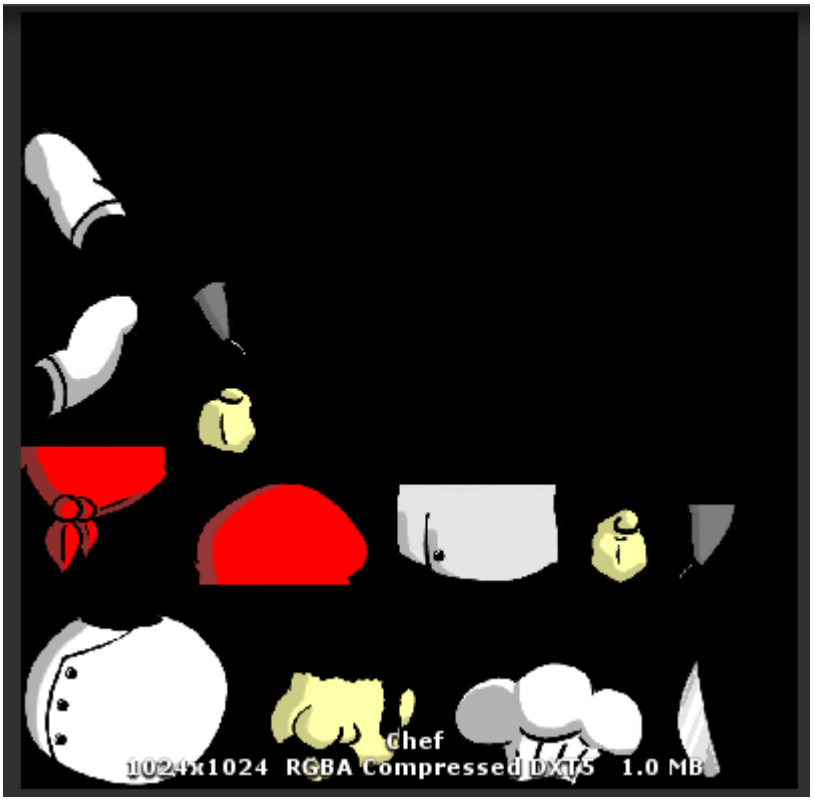


Figure 3-7 Texture - High Padding (30 pixels)



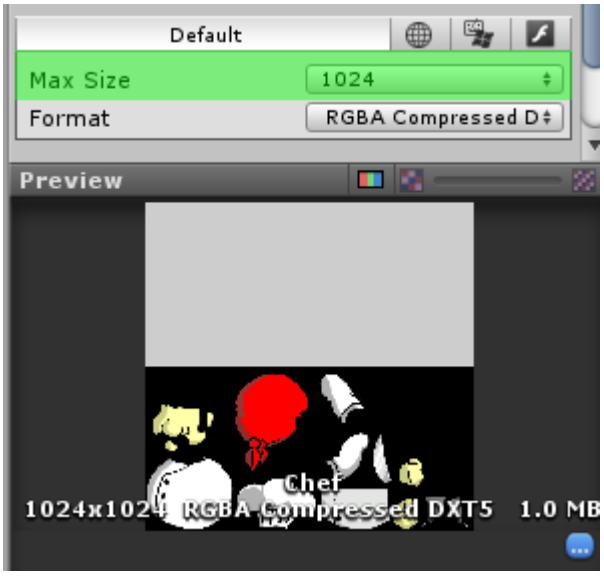
See the FAQ for more information.

Max Atlas Size

This lets you set the maximum size of the final atlas texture. Limiting your atlas to a certain size will force the image generator to keep your atlas below this limit. This can be useful if the total size of your source textures exceeds the limitations of an atlas, such as on a mobile device.

You can also keep this value very high in the atlas editor and control the maximum size directly in Unity's texture inspector if you prefer.

Figure 3-8 Unity Texture Max Size



Note that if you set the max texture size too low, Unity will cut off the individual textures. This is a bug (or feature depending on how useful you find it) of Unity's texture packer and is not driven by SmoothMoves.

See Q: Why are my textures cut off in the texture atlas? for more details.

Force Square

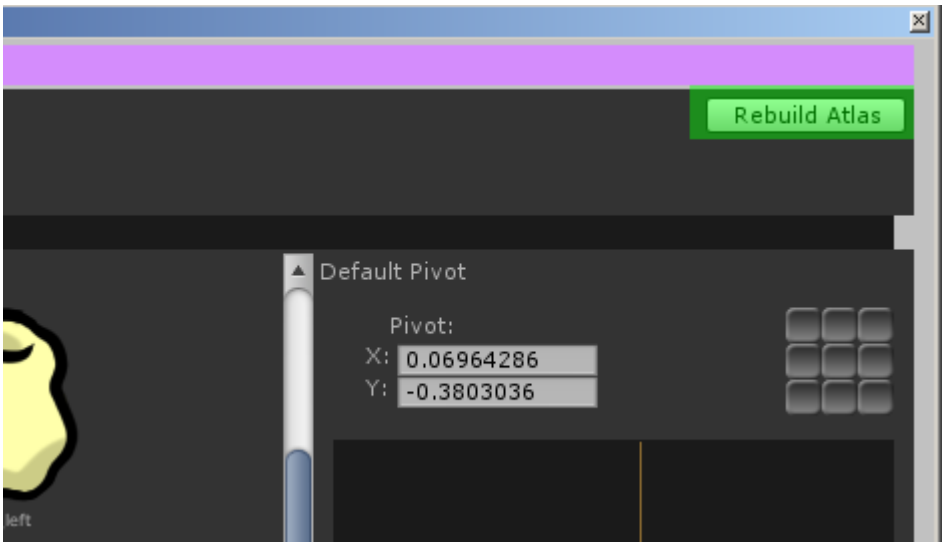
Forcing an atlas texture to be square means that the image generator will fill the atlas with empty space if the length and width are not equal. Having a square image is a requirement in some mobile development tools, such as iOS, if you are wanting to use PVRTC compression.

Rebuild Atlas

Whenever you make a change to the atlas such as adding / removing source textures or changing a pivot point of a texture, you will need to rebuild the atlas.

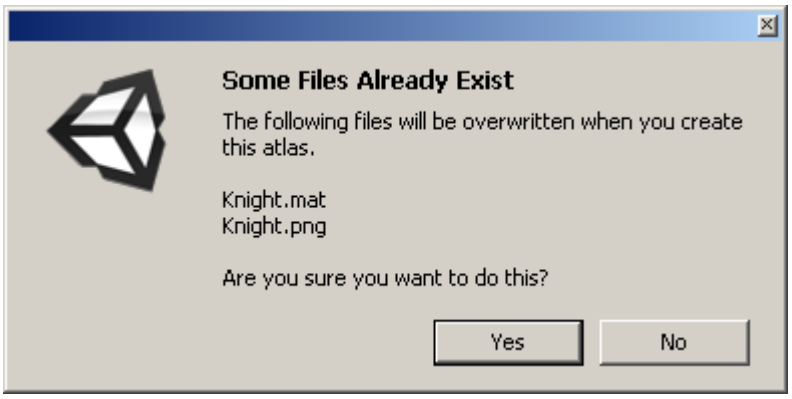
When a change has occurred, the source texture editor window background will be shaded a yellow color. The Rebuild Atlas button will also be shaded yellow too.

Figure 3-9 Rebuild Atlas



When rebuilding an atlas, if you have already created an atlas with its associated material and texture, you will be prompted that rebuilding will overwrite these files.

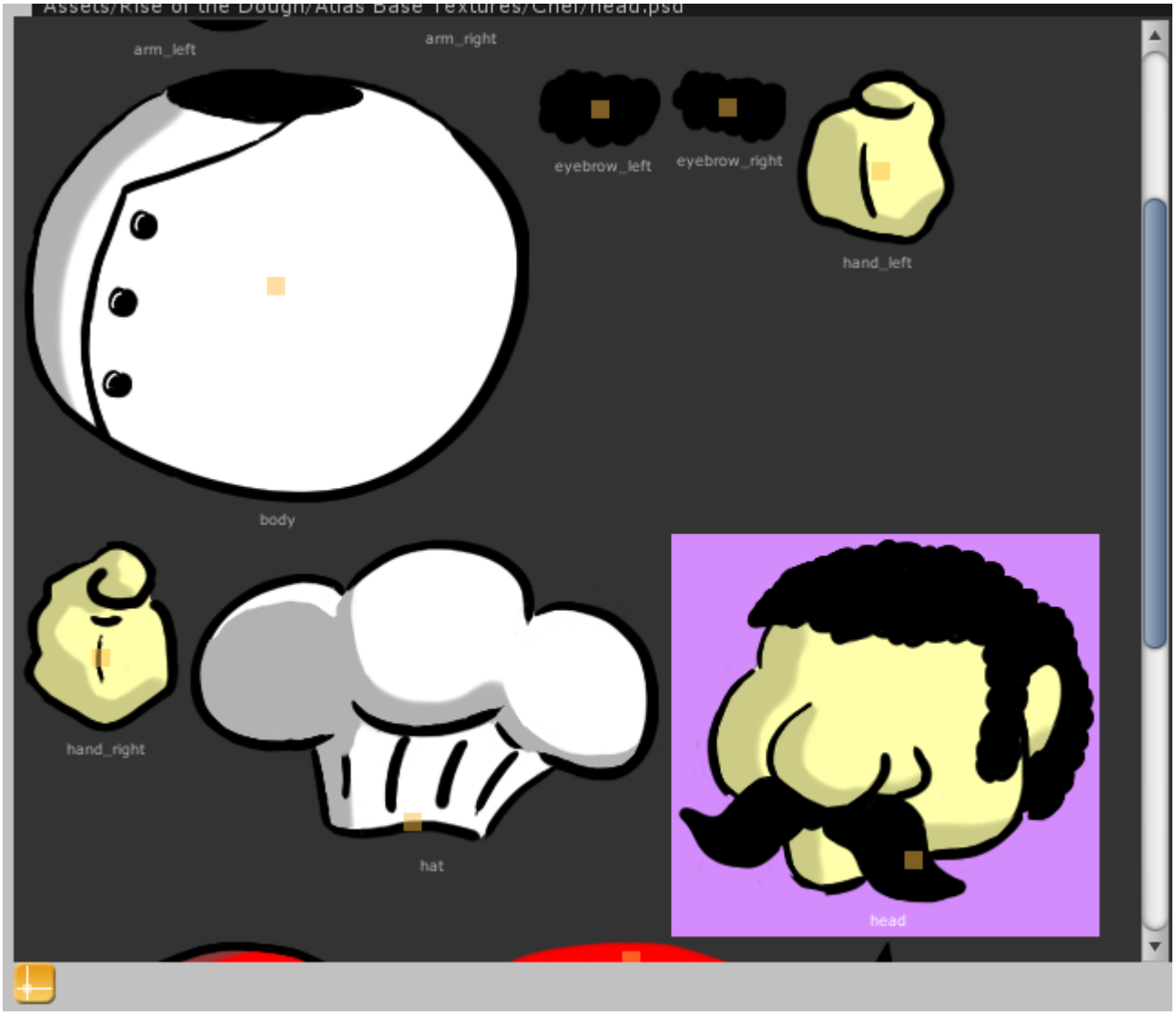
Figure 3-10 Atlas Files Exist



3.4 Source Texture Editor Window

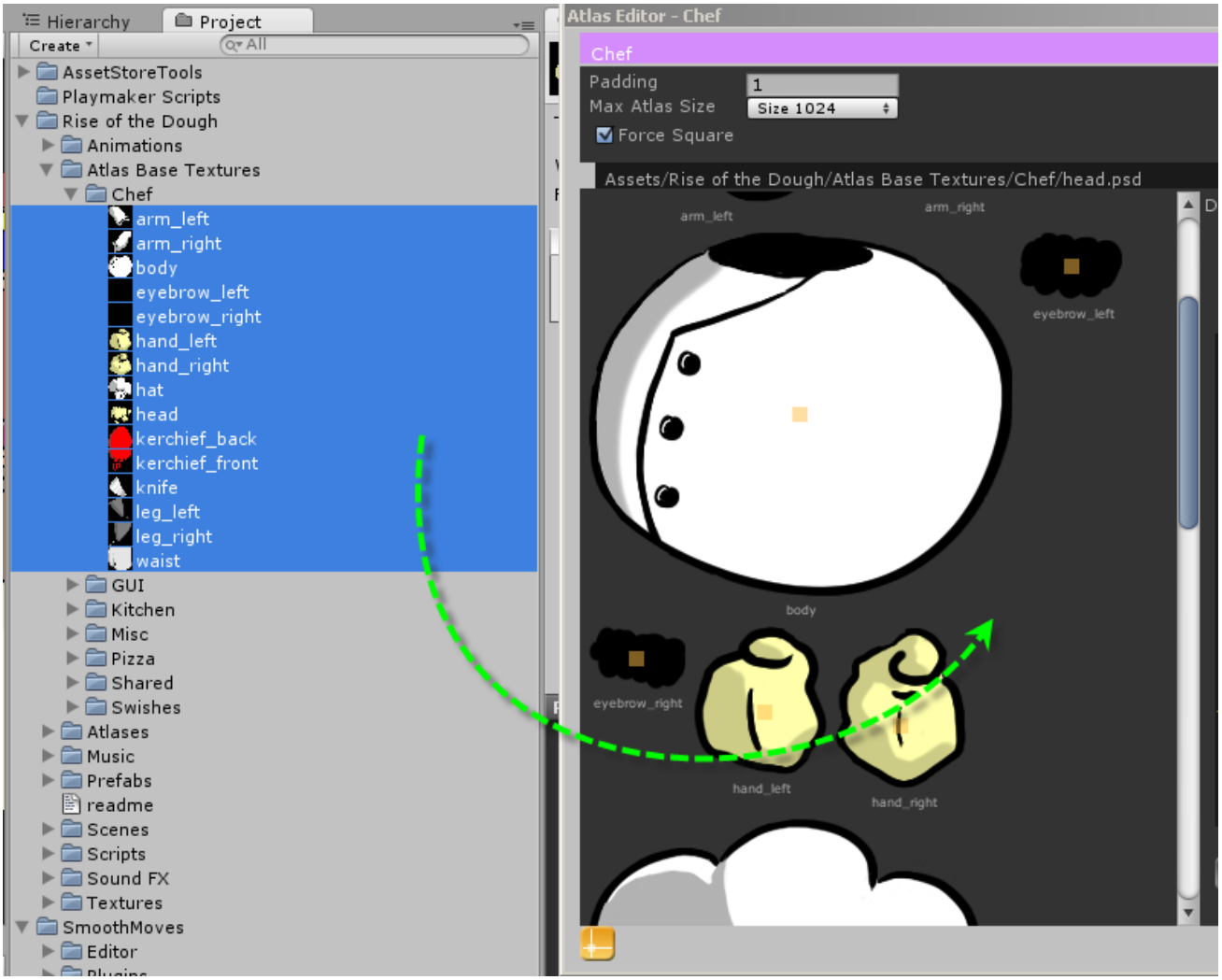
The source texture window allows you to change up the source textures that comprise your texture atlas.

Figure 3-11 Source Texture Editor Window



To populate the source texture editor window, drag and drop your source textures onto the grey background.

Figure 3-12 Drag and Drop Source Textures



To delete a source texture so that it will not be included in the final atlas, select the texture (it will be highlighted purple) and press the delete key on your keyboard.

Figure 3-13 Select Texture and Delete

To show or hide the default pivot points of each texture, toggle the pivot button. When the default pivots are visible, you will see small orange boxes centered at each texture's pivot point.

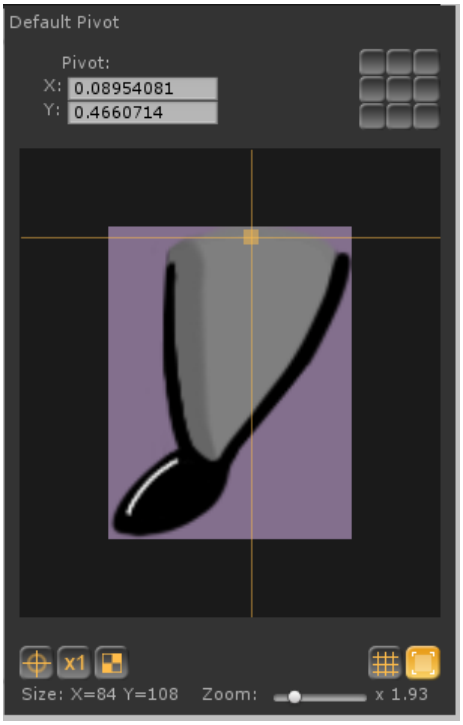
Figure 3-14 Pivot Toggle

3.5 Pivot Editor

Each texture can have a default pivot point. A pivot point is the position that the texture will rotate and scale around in your animations.

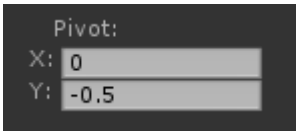
The default pivot can be overridden in your animations, but by setting it here in the atlas editor, you will save a lot of time by not having to set it over and over in the animation editor. A lot of your textures' pivots will probably not move around much in the animation, so having a default pivot point can increase your workflow.

Figure 3-15 Default Pivot Editor



Manual Pivot Offset

Figure 3-16 Manual Pivot Offset



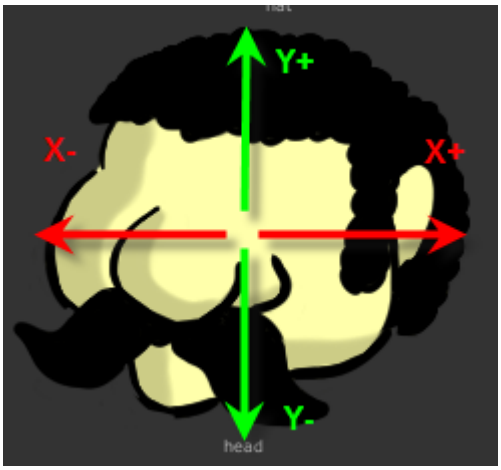
You can set the pivot offset manually by typing in values in the X and Y boxes. The pivot offset is relative to the texture width and is centered around the middle of the texture.

For example, the lower left corner is: x = -0.5, y = -0.5 because it is half of the texture width toward the left and half of the texture height toward the bottom.

The upper right corner, incidentally, is x = 0.5, y = 0.5 since it is half the width toward the right and half the height toward the top.

The center of the image is x = 0, y = 0 since there is no offset.

Figure 3-17 Pivot Texture Coordinates



Common Pivot Points

Figure 3-18 Common Pivot Points

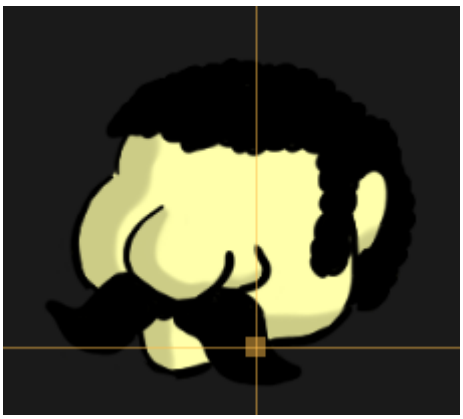
You can set commonly used pivot points quickly by pressing one of the nine buttons in the upper right corner. These will jump your pivot point to:

- upper left
- upper center
- upper right
- middle left
- middle center
- middle right
- lower left
- lower center
- lower right

Pivot Editor Window

The Pivot Editor Window lets you move your pivot point around with your mouse.

Figure 3-19 Pivot Graphical Editor



To move the pivot point, left click with your mouse where you'd like to set the pivot point.

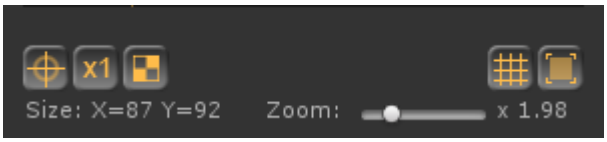
To move the image around, drag your mouse while holding down the middle mouse button. Alternatively you can move the image by holding the Windows button (or Command button on a Mac) and the left mouse button down while dragging.

To zoom from this window, scroll the middle mouse wheel.

Pivot Layout Controls

There are several controls that allow you to change the layout and look of your pivot editor window.

Figure 3-20 Pivot Layout Controls



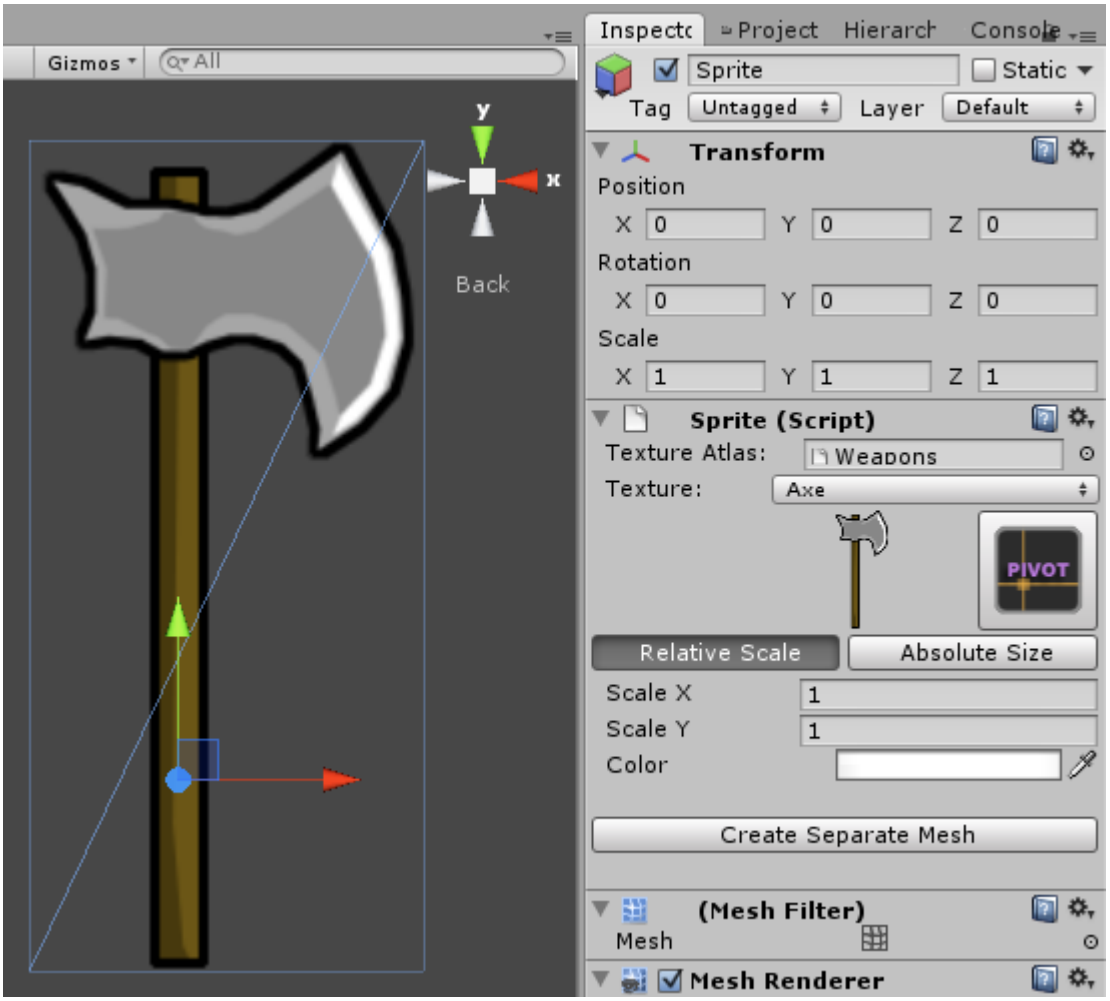
From left to right, top to bottom, these are:

- **Center:** Moves the axis origin back to the middle of the Pivot Editor window
- **Zoom x1:** Scales the texture back to a 1:1 pixel ratio
- **Toggle Contrast:** Switches the background color to the opposite contrast for better viewing of lighter or darker textures
- **Show Grid:** Toggles the grid and axis for easier alignment of the pivot point
- **Show Bounds:** Toggles the background bounding box so that you can easily see the extents of your texture
- **Size:** The width and height of your texture
- **Zoom:** The current scaling of the texture in the Pivot Editor Window.

4.

Sprites

Figure 4-1 Sprite



Sprites are just four vertices making up a quad mesh. They are tied to an atlas so that they can dynamically batch to reduce draw calls. Sprites are not used in animations in SmoothMoves, but are more for background elements or decoration.

4.1 Creating a Sprite

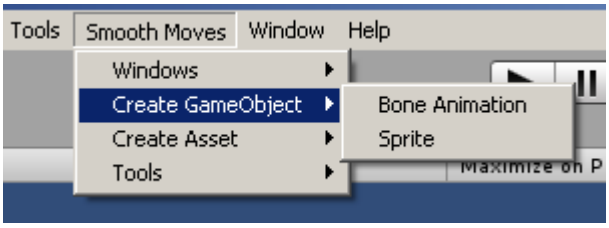
You can create a sprite in one of three ways:

- Through the Unity menu
- Through the Hierarchy menu
- By adding a sprite component script to an existing gameobject

Creating a Sprite Through the Unity Menu

In the Unity menu, go to Smooth Moves > Create GameObject > Sprite.

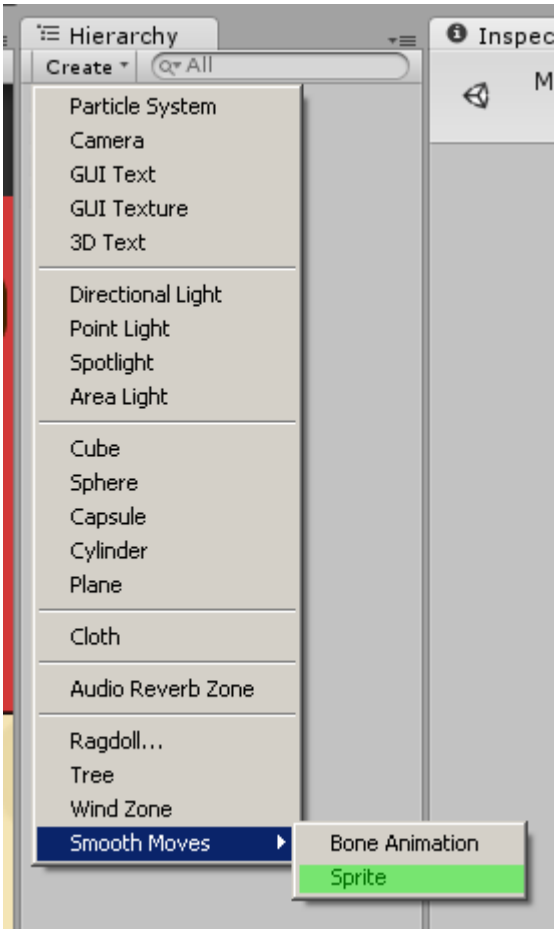
Figure 4-2 Create Sprite Through Menu



Create a Sprite Through the Hierarchy Menu

You can also create a sprite through the Hierarchy's Create menu by going to Create > Smooth Moves > Sprite.

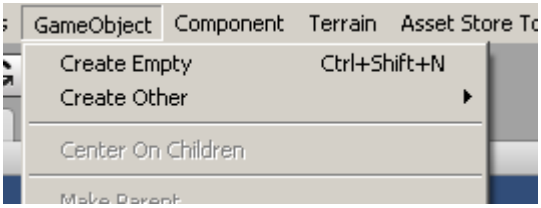
Figure 4-3 Create Sprite Through Hierarchy Menu



Adding a Sprite Script to a GameObject

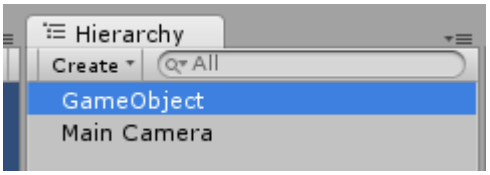
Create an empty gameobject by going to the Unity menu GameObject > Create Empty.

Figure 4-4 Create Empty GameObject



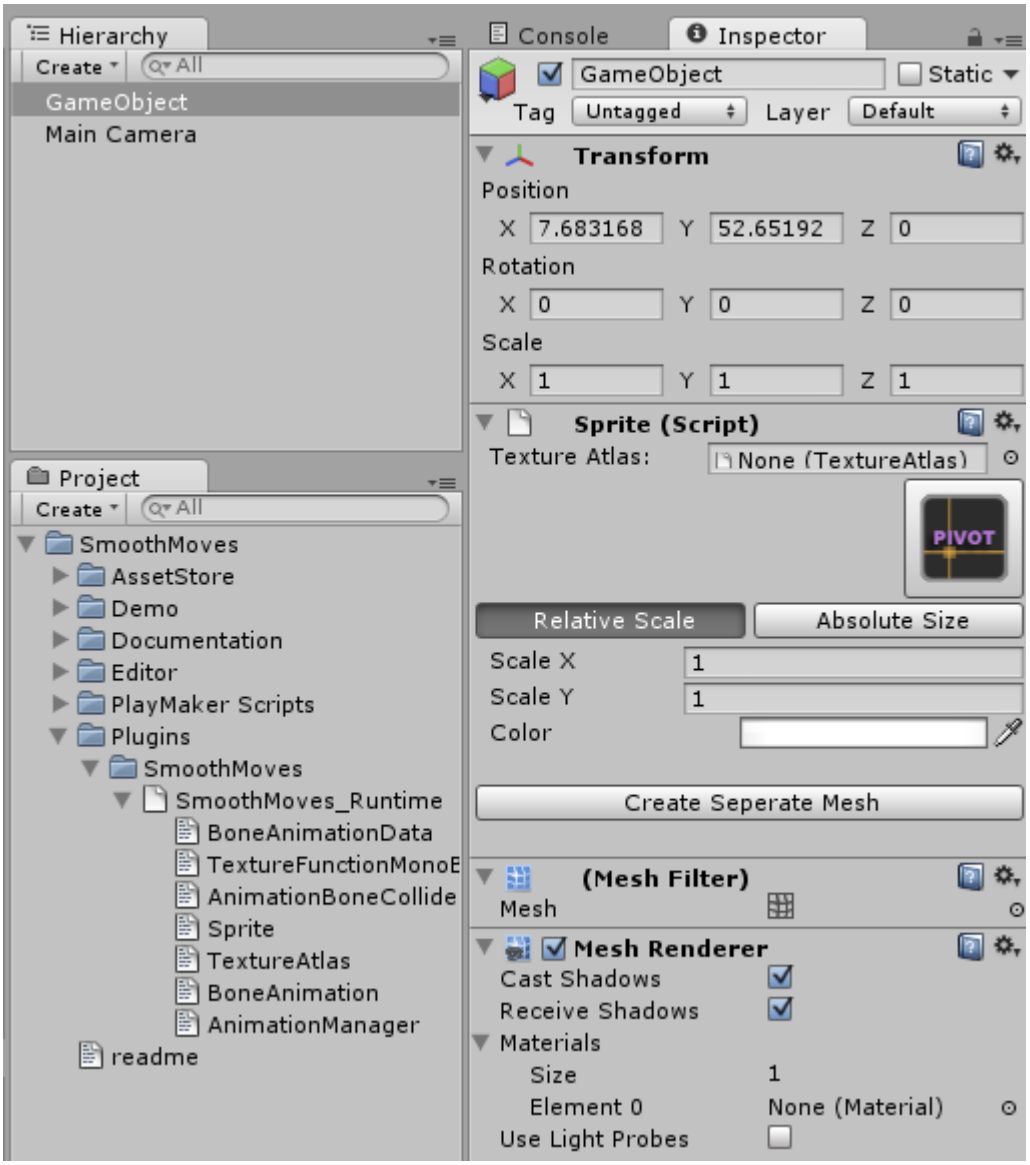
Select the newly created GameObject in the Hierarchy Window.

Figure 4-5 Select GameObject



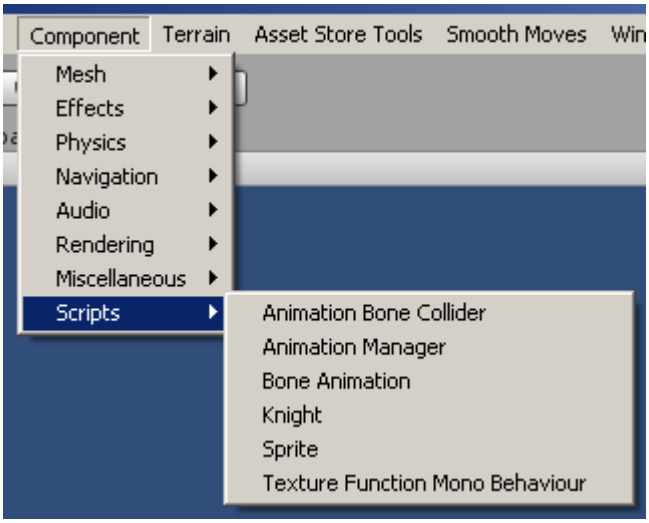
Drag the Sprite script component onto the new GameObject from the SmoothMoves_Runtime.dll library.

Figure 4-6 Drag Sprite Script to GameObject



Alternatively, you can add the sprite component through the Unity menu by going to Component > Scripts > Sprite.

Figure 4-7 Add Sprite Component Through Menu



Other Components

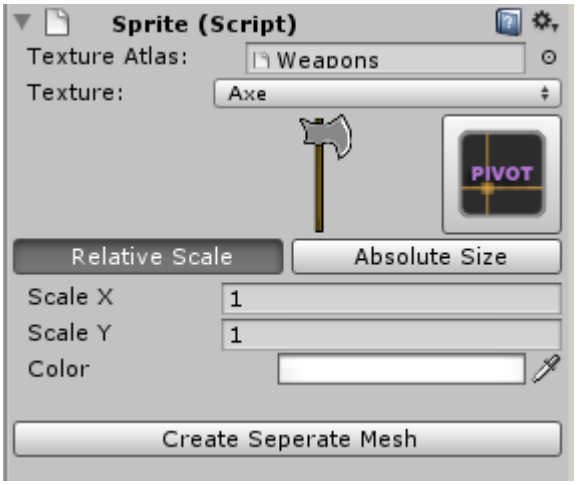
When you create a sprite, Smooth Moves will automatically add other components for the sprite to work, including:

- **Mesh Filter**: Used to store the actual mesh vertex data
- **Mesh Renderer**: Used to render the mesh in the game window

You don't need to adjust these components since they are handled automatically and modified behind the scenes.

4.2 Sprite Component

Figure 4-8 Sprite Component



The sprite component has several properties, including:

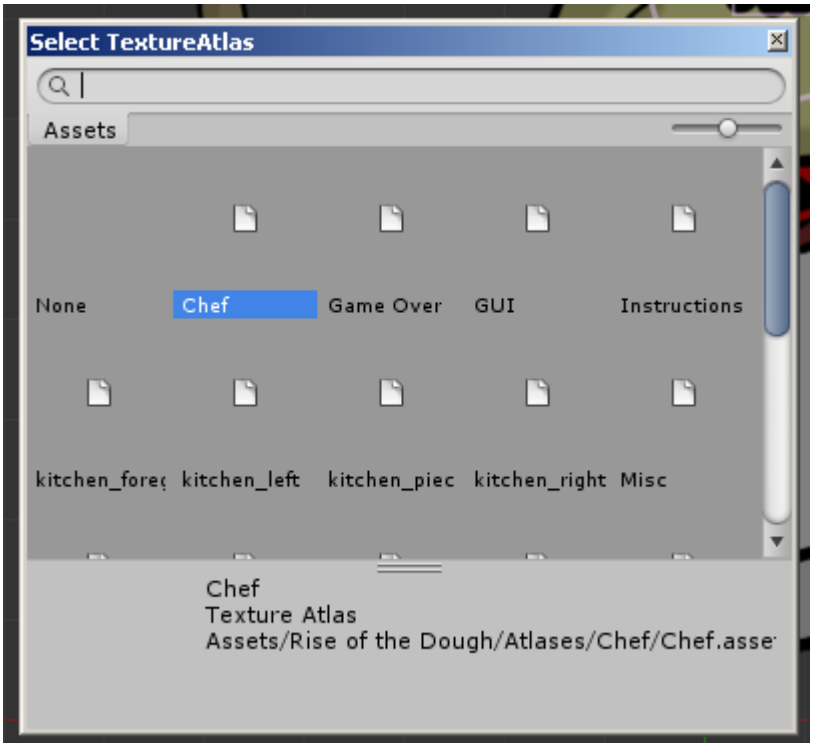
- **Atlas**: The collection of textures to choose from
- **Texture**: The specific atlas texture to render for this sprite
- **Pivot Offset**: the center point for the texture to position, rotate, and scale around
- **Scale / Size**: Scale is relative to the original texture size. Size is an absolute pixel value.
- **Color**: Hue of the mesh
- **Mesh Seperator**: Function to make a duplicated gameobject or instantiated prefab seperate from its source

Set Atlas

Figure 4-9 Atlas

To set the atlas, click the circle to the right of the atlas property. This will bring up the atlas selection window where you can choose from the atlases in your Project.

Figure 4-10 Select Atlas

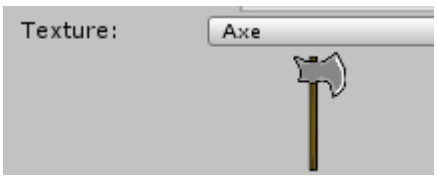


Once your atlas is set, Smooth Moves will automatically set the material of your Mesh Renderer component to the atlas' material and populate the texture list.

Figure 4-11 Mesh Renderer Material

Set Texture

Figure 4-12 Texture



To change the texture, click on the drop down list and select the texture name that you want to

display. When you change the texture, the small graphic below the list will update to show which texture you have selected.

Set Pivot Offset

Figure 4-13 Pivot Offset

When you click on the pivot offset button, the Pivot Offset Editor window will open.

Please refer to the 3.5 Pivot Editor for more information on how to use the pivot offset window.

The only difference in the sprite pivot offset window is that you can lock or unlock the pivot offset to the default set in the atlas. When the offset is locked, you can't adjust it and it will use what is set in the atlas.

Figure 4-14 Pivot Offset Locked to Default

When the offset is unlocked, you can adjust it freely, overriding what is set in the atlas.

Figure 4-15 Pivot Offset Unlocked

Using the default pivot offset in the atlas by locking can save you a lot of time by not having to set the pivot over and over for a group of sprites.

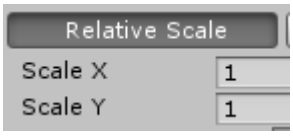
Set Relative Scale / Absolute Size

You can set the relative scale, or absolute size, but not both at the same time.

You should not set the sprite's size through the Unity transform scale. Creating a different scale for numerous sprites will cause Unity to not batch the sprites, resulting in higher draw calls and lower performance. Instead, use the size settings explained here.

Relative Scale

Figure 4-16 Relative Scale

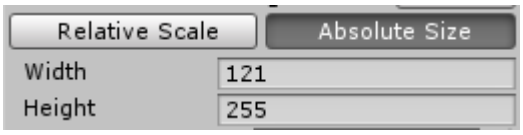


Click the Relative Scale button to switch the sprite's size mode to relative scale.

The relative scale is a relative value to the sprite texture's original size. For example, if the sprite was 100 px wide and 40 px high and your relative scale is set to x = 0.5f, y = 0.5f, then your sprite will be 50 px wide and 20 px high.

Absolute Size

Figure 4-17 Absolute Size



Click the Absolute Size button to switch the sprite's size mode to absolute size.

The absolute size will ignore the texture's original dimensions and force the sprite to be the width and height that you specify here.

Set Color

Figure 4-18 Color

To set the color, click on the color swatch to bring up a color chooser. You can also click on the eyedropper and select a portion of the screen to match that color.

Mesh Seperator

When you duplicate a sprite, the mesh is shared. Any changes you make to one of the sprites is propagated to all the sprites that share the mesh. This may be desired, but if it is not, you can easily separate the mesh for any sprite by clicking on the Create Separate Mesh button.

Figure 4-19 Create Seperate Mesh

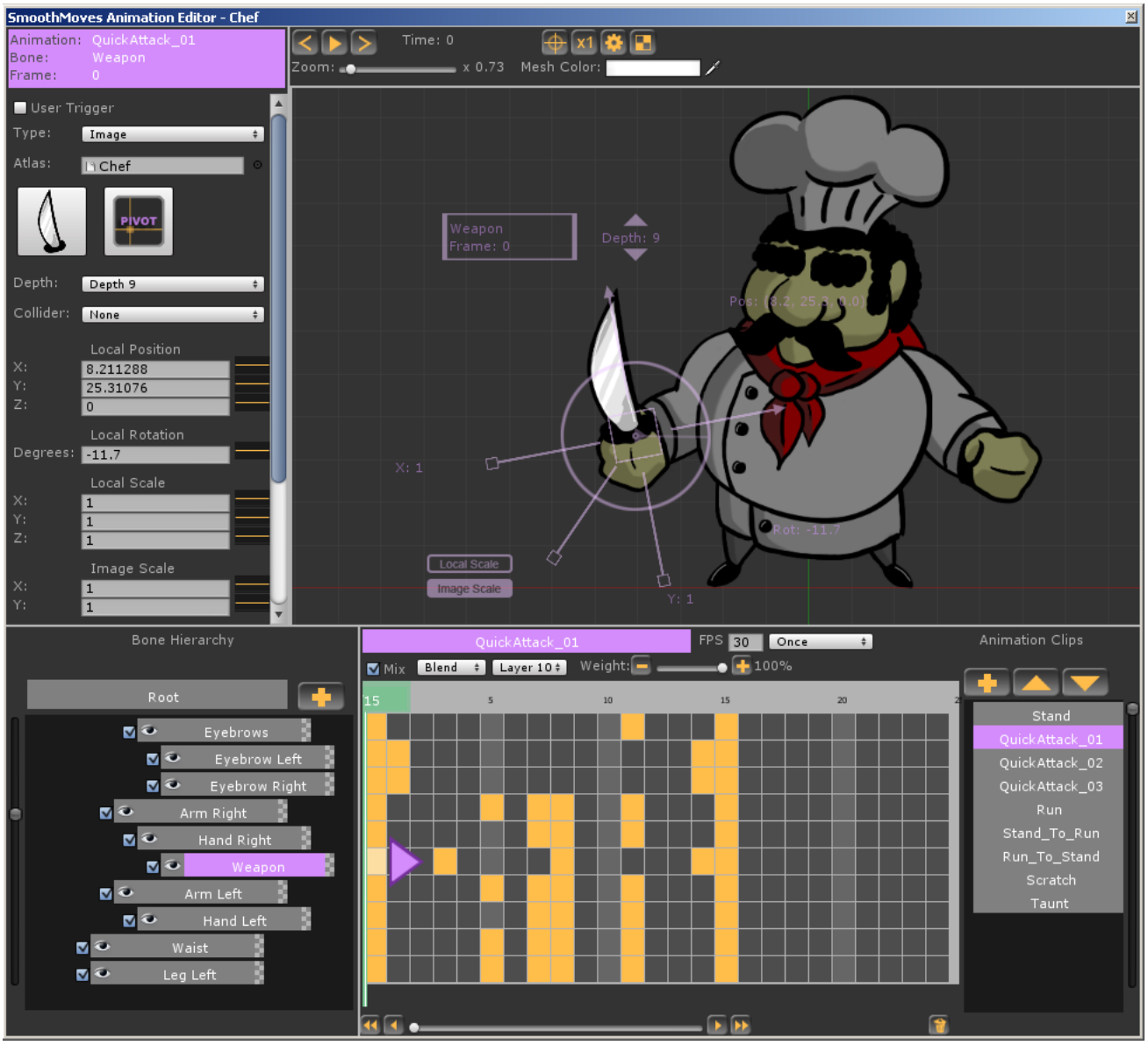
If a sprite is cloned from a prefab, then a different button will appear that has the same functionality. To separate this sprite's mesh from the prefab, click on the Disconnect From Prefab button.

Figure 4-20 Disconnect From Prefab

5.

Animation Editor

Figure 5-1 Animation Editor Settings



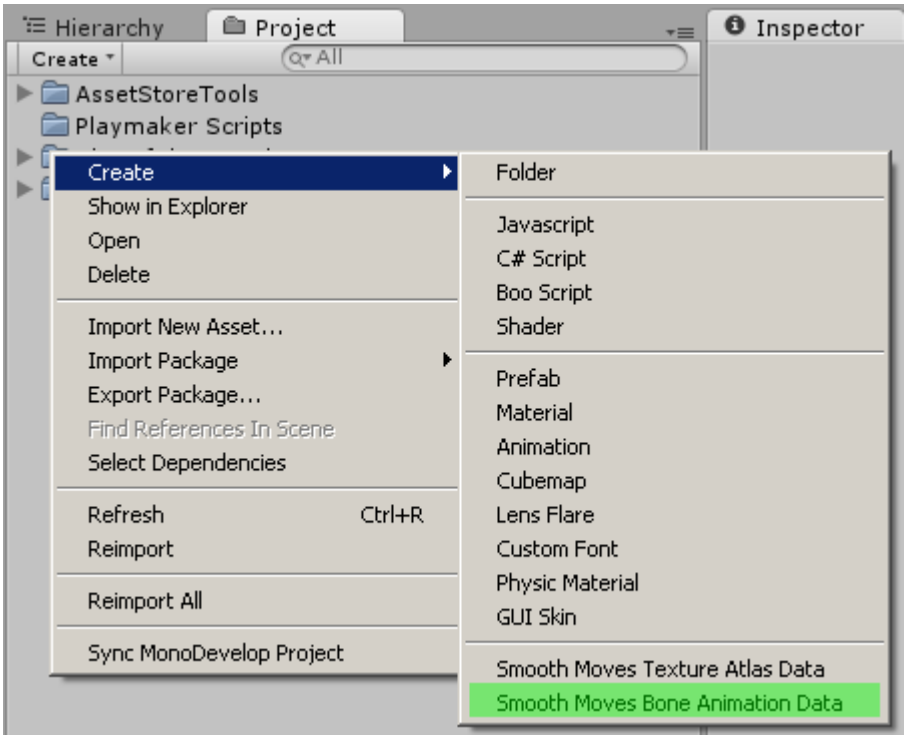
5.1 Overview

The Animation Editor is where you will create your animations. SmoothMoves uses the data created here to generate a skinned mesh and animation component that Unity will use just like any other mesh imported from an FBX file created in a third party animation package.

5.2 Creating a Bone Animation Data Asset

To create an animation asset, right-click in your project window and select Create > SmoothMoves Bone Animation Data.

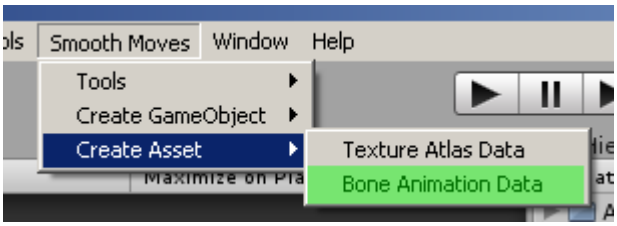
Figure 5-2 Create Bone Animation Data Asset Through Project Context Menu



You can also create an asset through the Unity menu by selecting SmoothMoves > Create Asset > Bone

Animation Data.

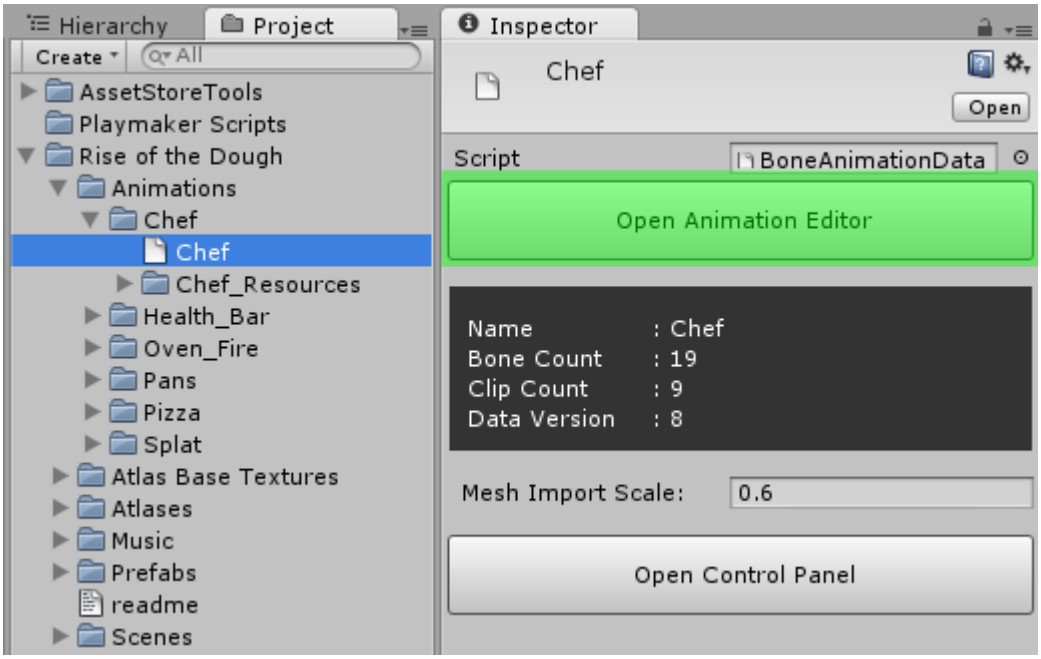
Figure 5-3 Create Bone Animation Data Through Menu



5.3 Opening the Animation Editor

To open the animation editor, click on the bone animation data asset in the Project window and then click the Open Animation Editor button in the inspector window.

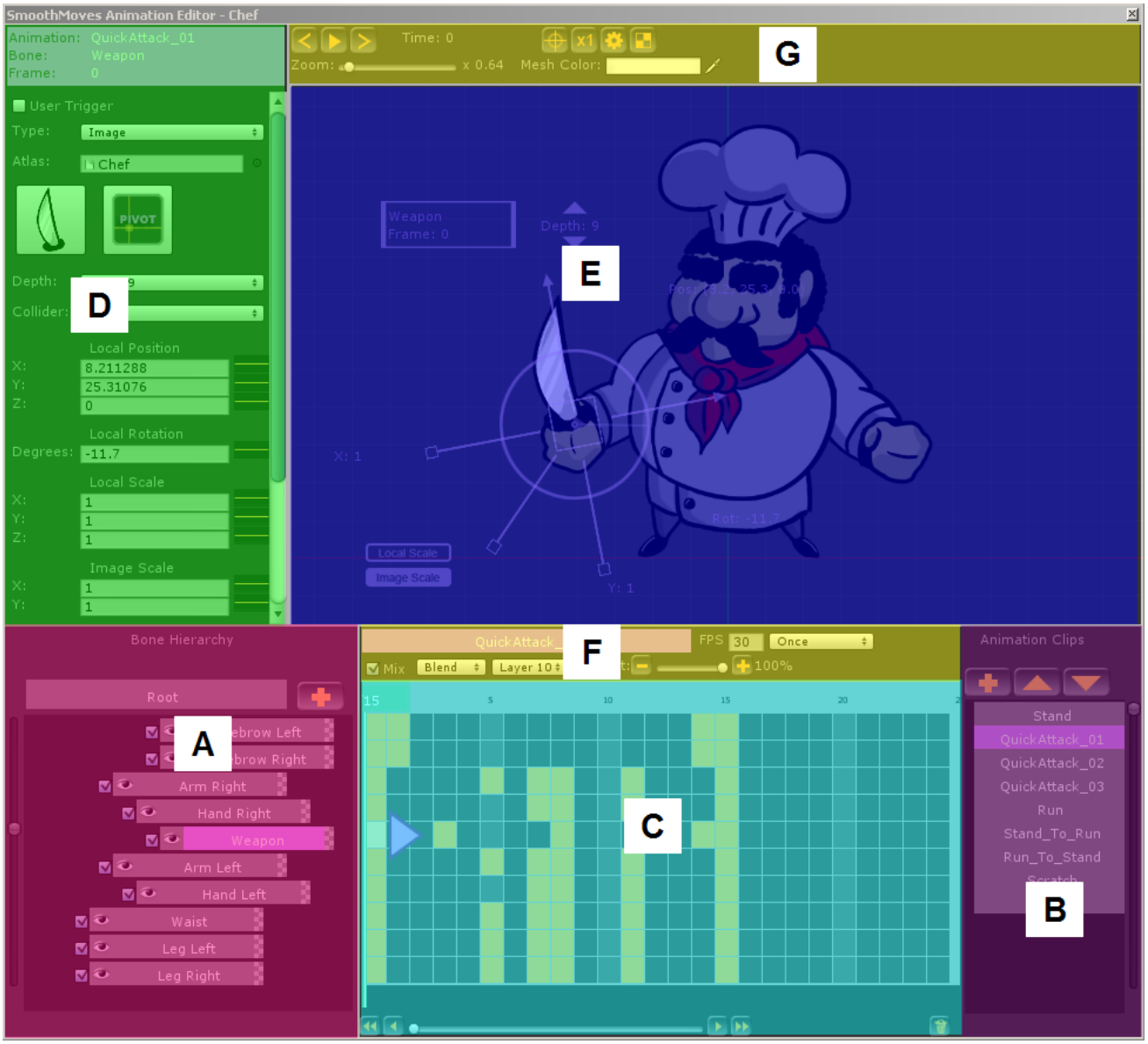
Figure 5-4 Open Animation Editor Asset



5.4 Layout

The Animation Editor allows you to organize your source textures into a hierarchy that can be keyframed. There are six main sections of the editor that are highlighted in different colors here:

Figure 5-5 Animation Editor Layout



- **A: Bone Hierarchy**: Bones are added, removed, and reorganized into parent-child relationships
- **B: Animation Clips**: clips are added, deleted, and reorganized
- **C: Timeline**: Keyframes are set, deleted, and moved around for each animation clip and bone
- **D: Keyframe Properites**: position, rotation, scale, color, depth, and other properties are set for the selected keyframe

- **E: Animation Window**: Bones are repositioned, rotated and scaled visually
- **F: Animation Clip Settings**: Clip speed, wrap mode, mixing, layers, and blend weight is set here
- **G: Animation Controls**: Animation is played and settings are modified

5.5 A: Bone Hierarchy

The bone hierarchy lists all the bones in your animation. The bones are shared among all animation clips. All animations have a Root bone from which all other bones are attached. Indented bones are attached to another bone, forming a parent-child relationship. Child bones will move, rotate, and scale with their parents.

Adding Bones

To Add a new bone, you can either click the plus button in the Bone Hierarchy window, or you can right click a bone and select Add Bone from the context menu, including the Root bone.

Adding a bone will add the bone to all animation clips in the animation.

Figure 5-6 Add Bone Button

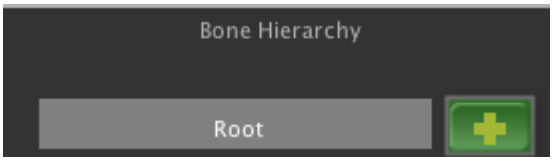
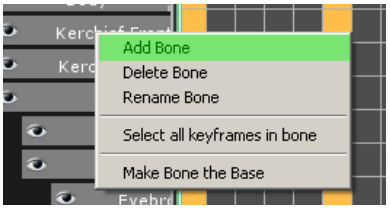


Figure 5-7 Add Bone Context Menu



Windows Keyboard Shortcuts:

- `Ctrl + A`: Adds a bone to the Root bone
- `Ctrl + Shift + A`: Adds a bone to the currently selected bone

Mac Keyboard Shortcuts:

- `Cmd + A`: Adds a bone to the Root bone
- `Cmd + Shift + A`: Adds a bone to the currently selected bone

Deleting Bones

You can delete a bone by right-clicking it and selecting Delete Bone from the context menu.

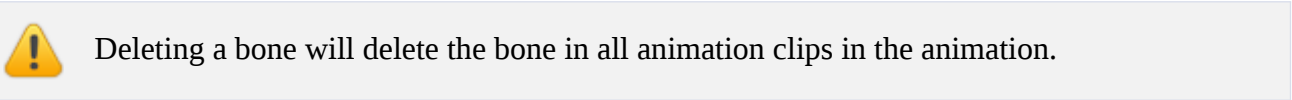
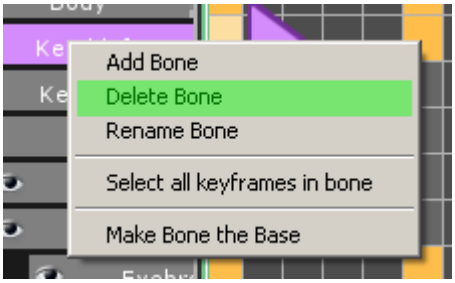
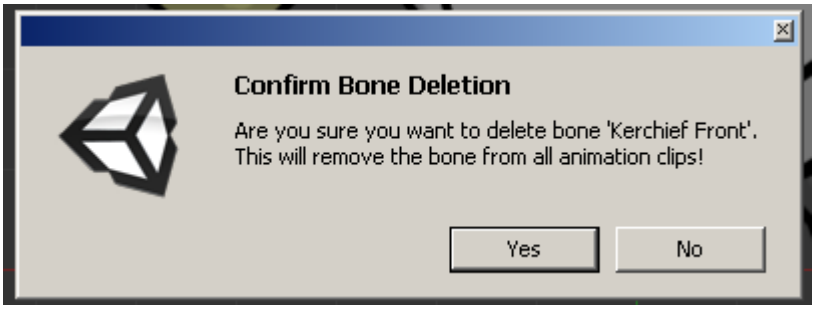

Deleting a bone will delete the bone in all animation clips in the animation.

Figure 5-8 Delete Bone Context Menu



You will be asked to confirm that you want to delete the selected bone.

Figure 5-9 Delete Bone Confirmation


Confirm Bone Deletion
Are you sure you want to delete bone 'Kerchief Front'.
This will remove the bone from all animation clips!
Yes
No

Windows and Mac Keyboard Shortcuts:

- `Delete`: Deletes the currently selected bone
- `Backspace`: Deletes the currently selected bone

Renaming a Bone

To rename a bone, select a bone, right-click for the context menu and click Rename Bone. The bone label will change to a textbox that you can use to change the name of the bone. When you are finished renaming, just click elsewhere or type the `Enter` key.

Figure 5-10 Rename Bone Context Menu

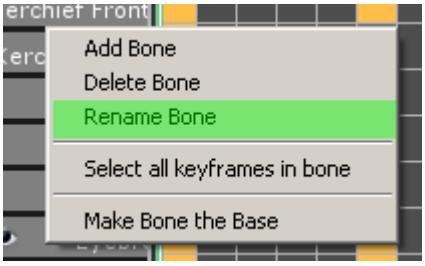
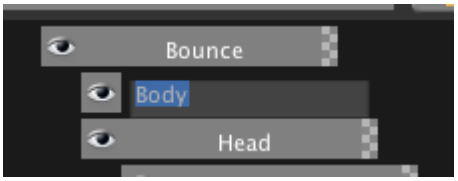


Figure 5-11 Renaming Bone



Windows and Mac Keyboard Shortcuts:

- `R`: Switches bone to rename mode
- `Enter`: Finalizes new name

Reordering Bones

You can change the parent-child relationships between bones by dragging a bone to another parent. If you drag a bone to the Root, the bone will not have any parents other than the Root bone. You

cannot drag a bone to one of its own children.

When a bone is being dragged, it will be colored a light orange. The parent target bone will be highlighted a light green indicating which bone will receive the child when released.

Figure 5-12 Reorder Bone

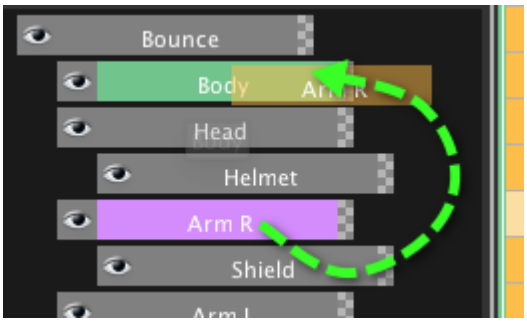


Figure 5-13 New Bone Hierarchy

Windows and Mac Keyboard Shortcuts:

- Esc: Cancel the bone reordering and return to the previous hierarchy state

Making Bone the Base

You can quickly shift your hierarchy to make a selected bone the new base bone. This bone is parented directly under the Root bone and all other bones become children of the selected bone. This can be useful if you decide to add a bone that should be at the top of the hierarchy. Instead of dragging each bone to the new base, this shortcut does it in one step.

To make a selected bone the base, right-click for the context menu and select Make Bone the Base.

Figure 5-14 Make Bone the Base

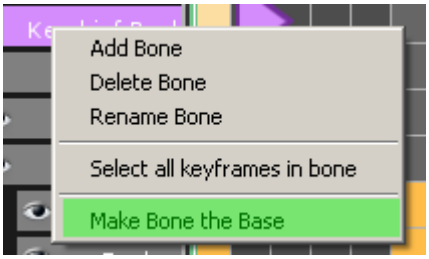
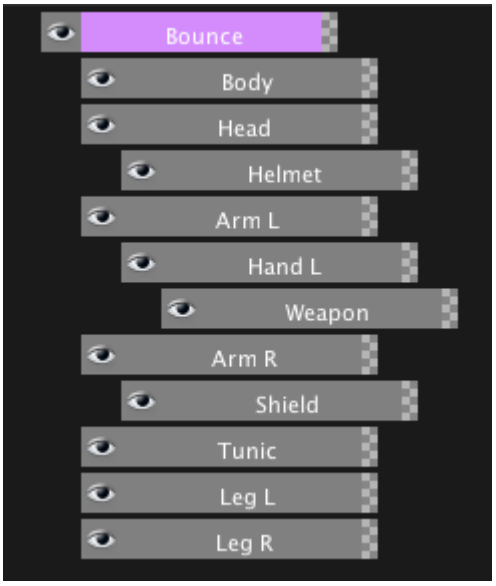


Figure 5-15 Before Bone is Base

Figure 5-16 After Bone is Base



Bone Visibility

You can toggle the visible state of a bone both in the editor and in your project. To change a bone's visibility, click on the eyeball next to the bone. The bone can be in one of three states:

1. **Eyeball Open**: The bone is visible in the editor and the project
2. **Eyeball Closed**: The bone is not visible in the editor, but will show up in the project
3. **X**: The bone will not show up in the editor or the project

Figure 5-17 Bone Visible In Editor

Figure 5-18 Bone Visible In Editor

Figure 5-19 Bone Hidden In Editor

Figure 5-20 Bone Hidden In Editor

Figure 5-21 Bone Hidden In Editor and Project

Figure 5-22 Bone Hidden In Editor and Project

You change the bone's visibility at runtime with the function HideBone. You can also get the visibility state of a bone at runtime with the function IsBoneHidden. The bone will continue to be moved, rotated, scaled, and switched while it is hidden.

Bone Color

You can set the color of a bone, which will affect the color of the textures of the bone in all animation clips. To set the color, click on the checkered area on the right side of the bone.

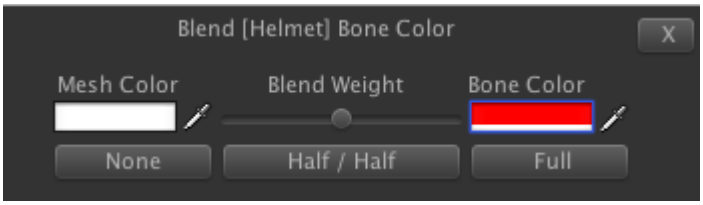
Figure 5-23 Bone Color Click

This will open up a popup window that allows you to change the mesh color, the bone color, and the bone color's weight. The weight of the color is how much of the color to apply. The higher the weight, the more the bone will reflect the color that you set here. The lower the weight, the more the bone will reflect the mesh color.

See the chapter on 7. Color And Lighting for more information.

Note that you can also set the mesh color in the animation controls window.

Figure 5-24 Set Bone Color



After a bone color is set, you will see the color show up over the checkered area on the left. The color will cover the checkered area depending on how much blending weight is applied. For example, a blending weight of 50% (half / half) will show the color bar covering half the checkered area.

Figure 5-25 Bone Color Set

For any color changes to be processed by SmoothMoves at runtime, you will need to be sure the Update Colors checkbox is set on the bone animation's inspector window (not the asset's inspector window). This is turned off by default to improve performance for animations not using color.

See the FAQ for more information.

Mixing Bones

When an animation clip is set to Mix, you can specify which bones will be used in the mixing. Checkboxes will appear next to each bone. To enable a bone for mixing, just make sure that the checkbox is set to true.

Figure 5-26 Mixing

If a bone is not selected when mixing, then its animation curves will not be processed by Unity when playing the animation. Whatever animation is playing on a lower layer will handle these non-mixed bones instead.

For more information see 5.10 F: Animation Clip Settings or Unity's documentation on Character Animation or Animation Scripting.

Scrolling the Bone Hierarchy

You can scroll the bone hierarchy by using the vertical slider on the far left. This will also scroll the timeline vertically as well.

Figure 5-27 Scroll Bones

Windows and Mac Mouse Shortcuts:

- `Middle Mouse Wheel`: Scrolls the bone hierarchy vertically

5.6 B: Animation Clips

Your animated character can have multiple clips. These clips can later be set up to play separately, or mix and blend together just like you would with a mesh imported from a third party animation tool.

Adding an Animation Clip

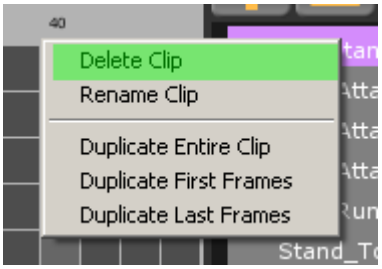
To add an animation clip, click the plus button in the animation window.

Figure 5-28 Add Animation

Deleting an Animation Clip

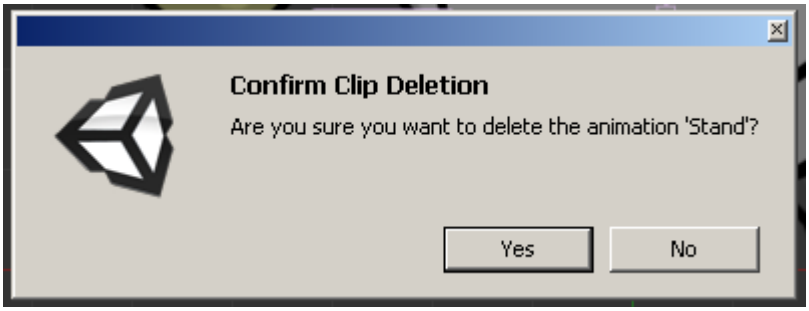
To delete an animation clip, right-click on the clip you want to delete and then select Delete Clip

Figure 5-29 Delete Clip



You will be asked to confirm that you wish to delete this clip.

Figure 5-30 Confirm Delete Clip



Windows and Mac Keyboard Shortcuts:

- `Delete`: Deletes the currently selected clip
- `Backspace`: Deletes the currently selected clip

Renaming a Clip

To rename a clip, select it then right-click for the context menu. Select Rename. The clip label will turn into a textbox that will allow you to update the name. To finalize, just click elsewhere or press the `Enter` key.

Figure 5-31 Rename Clip Context Menu

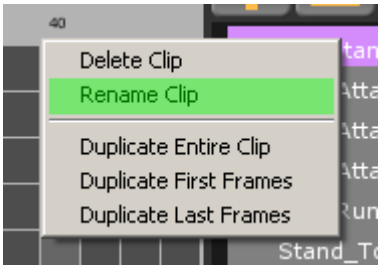
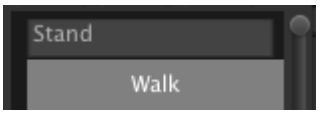


Figure 5-32 Renaming Clip



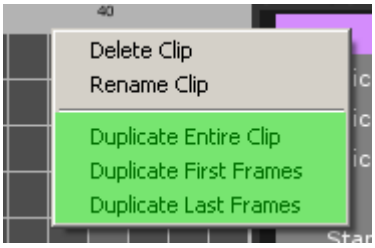
Windows and Mac Keyboard Shortcuts:

- `R`: Switches the currently selected clip to rename mode
- `Enter`: Finishes renaming the clip

Duplicating a Clip

You may want to duplicate a clip to save time setting up your textures on each bone. There are three ways you can duplicate a clip:

Figure 5-33 Duplicate Clips



1. **Duplicate Entire Clip**: This copies all keyframes from the selected clip to a new clip.
2. **Duplicate First Frames**: This copies the first frames of the selected clip to the new clip. This is useful if you want your new clip to have the same starting pose as the selected clip.
3. **Duplicate Last Frames**: This copies the last frames of the selected clip to the new clip. This is useful if you want your new clip to start where your last clip left off.

Reordering Clips

You can move your clips up and down to better organize them. The first clip in the list is the default clip, used by Unity when referencing the default.

Figure 5-34 Move Clip Up

Figure 5-35 Move Clip Down

Scrolling Animation Clips

You can scroll the animation clips using the vertical slider on the far right.

Figure 5-36 Scroll Clips

Windows and Mac Mouse Shortcuts:

- `Middle Mouse Wheel`: Scrolls the animation clip list vertically

5.7 C: Timeline

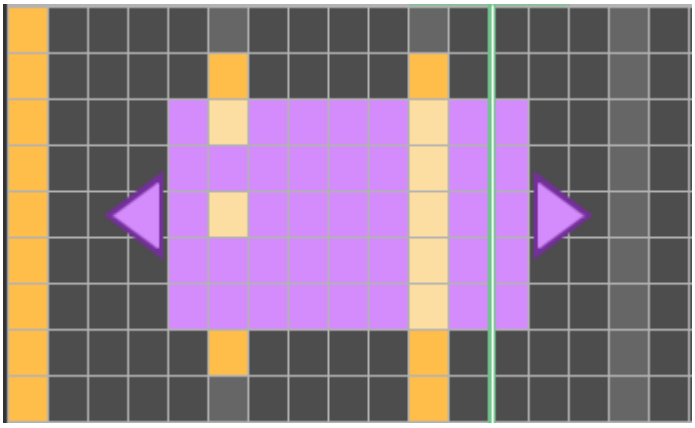
The timeline is where you set your keyframes for a selected animation clip. A keyframe is a point in time on a particular bone where some property of the bone changes. This property can be anything from position or rotation to what texture is showing on the bone. Before you can set these properties, however, you have to set the keyframes in the timeline.

The timeline is organized into two sections:

- **Frame Header**: This is where you can move the current animation time forward and backward as well as set columns of frames
- **Frames**: this is where you will set and manipulate the keyframes for the animation

Figure 5-37 Timeline Frame Header

Figure 5-38 Frames & Keyframes



Frames and Keyframes

A frame is any square in the timeline. A keyframe is a frame that has been set with some properties for the animation. Keyframes are what drive the animation to move, rotate, scale, switch textures, etc. Frames are used for timing and spacing between keyframes.

Figure 5-39 Frame

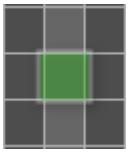
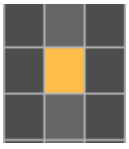


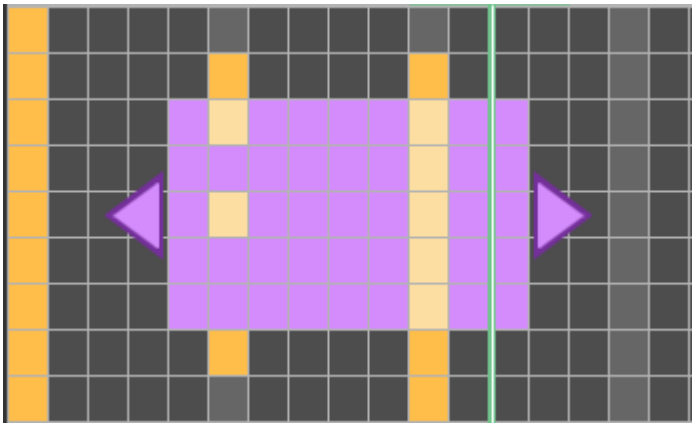
Figure 5-40 Keyframe



Selecting Frames

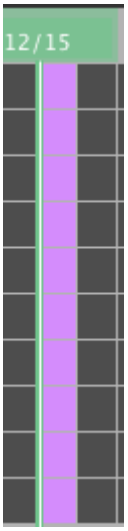
To select a frame or keyframe in the timeline, simple click with the mouse, drag to highlight your selection, then release the mouse button. Purple frames are selected frames without keys. Light orange frames are selected keyframes.

Figure 5-41 Select Frames



You can also select a column of frames by double-clicking the frame header section.

Figure 5-42 Select Column of Frames



Windows and Mac Keyboard Shortcuts:

- `Left Arrow`: Selects the frame to the left of the current selection
- `Right Arrow`: Selects the frame to the right of the current selection
- `Up Arrow`: Selects the frame above the current selection

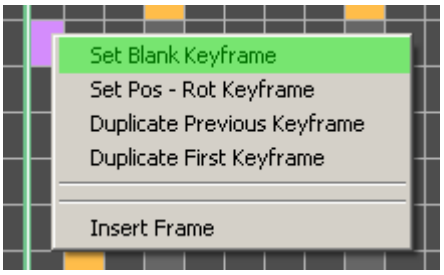
- `Down Arrow`: Selects the frame below the current selection

Setting a Keyframe

To set a keyframe, right-click the frame you want, then select Set Blank Keyframe. This adds a keyframe without any properties set. You can see this in the properties inspector.

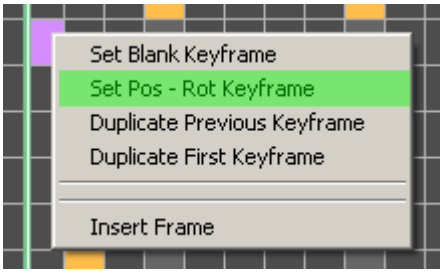
You can also set multiple frames if you have selected a group of frames.

Figure 5-43 Set Blank Keyframe



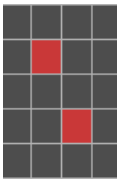
Since moving and rotating bones is the primary purpose of the timeline, there is also a shortcut in the context menu to set a position and rotation keyframe. All this does is first create a blank keyframe, then it sets the position and rotation properties to be used all in one step.

Figure 5-44 Set Position Rotation Keyframe



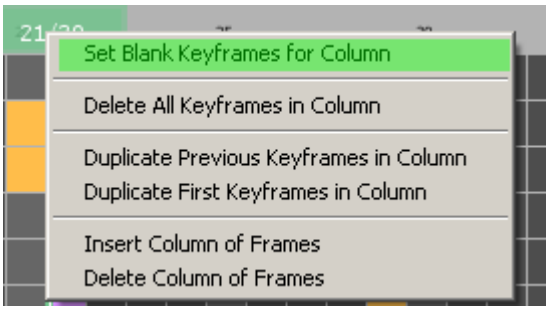
Blank keyframes will be colored red. Keyframes that have at least one property set on them will be colored orange.

Figure 5-45 Blank Keyframes



You can also set an entire column of keyframes by right-clicking on the frame header and selecting Set Blank Keyframes for Column.

Figure 5-46 Set Blank Keyframes For Column


Set Blank Keyframes for Column
Delete All Keyframes in Column
Duplicate Previous Keyframes in Column
Duplicate First Keyframes in Column
Insert Column of Frames
Delete Column of Frames

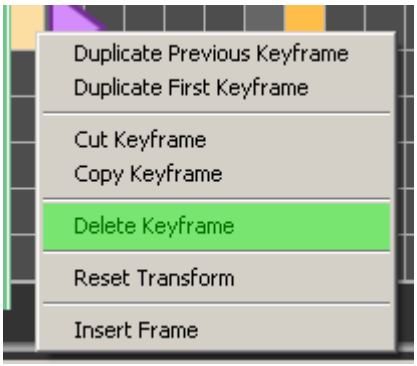
Windows and Mac Keyboard Shortcuts:

- B: Sets a blank keyframe
- P: Sets a position / rotation keyframe
- T: Sets a texture keyframe

Deleting a Keyframe

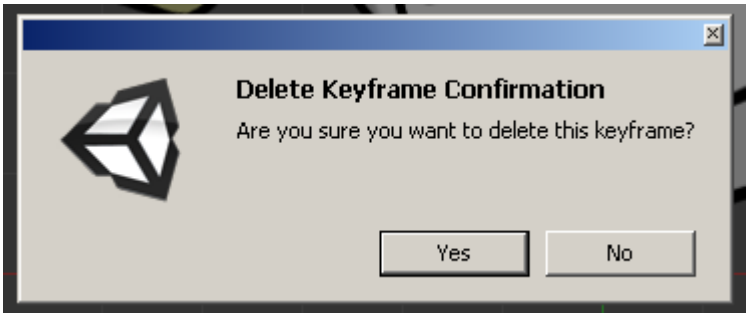
To remove a keyframe, simple select the keyframe, right-click, and select Delete Keyframe from the context menu. This will remove all properties for that keyframe.

Figure 5-47 Delete Keyframe



When you delete, you will be asked to confirm that you want to remove the keyframe.

Figure 5-48 Delete Keyframe Confirmation



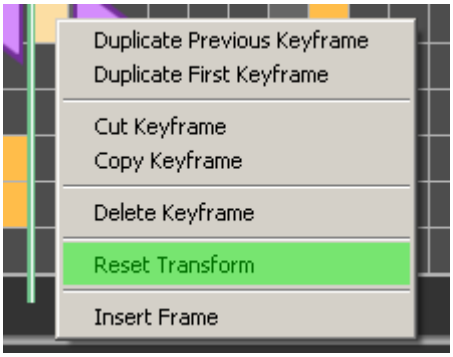
Windows and Mac Keyboard Shortcuts:

- `Delete`: Deletes selected keyframes
- `Backspace`: Deletes selected keyframes

Reset Transform

You can quickly set a keyframe's location, rotation, and scale properties back to their defaults by selecting keyframes, right-clicking, and selecting Reset Transform from the context menu.

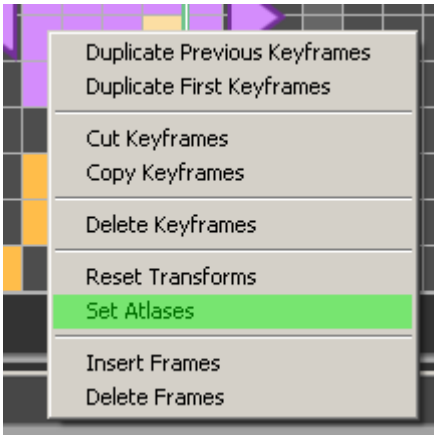
Figure 5-49 Reset Transform



Setting Atlases

You can quickly set multiple keyframes' atlases by selecting a range of keyframes, right-clicking, and selecting Set Atlases from the context menu. This is useful when setting up an animation that will be using one or a few atlases for all of its bones.

Figure 5-50 Set Atlases



This will pop up a window where you can set the keyframes' type and atlas. Be sure to set the type to Image if you want the keyframes to show a texture. When you have selected the atlas, click the Update Selected Keyframes button to apply the change.

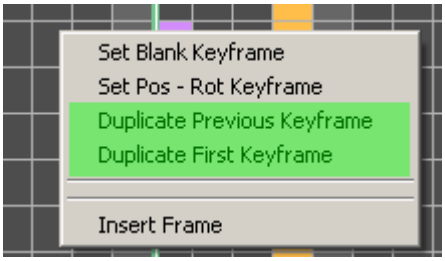
Figure 5-51 Set Atlases Popup Window

Duplicating Keyframes

You can duplicate keyframes in two ways:

1. **Duplicate Previous Keyframe**: copies the properties of the keyframe that occurs just before the currently selected frame.
2. **Duplicate First Keyframe**: copies the properties of the keyframe located at frame zero of the animation clip. This is useful for "bookending" and animation that loops around back to its starting position.

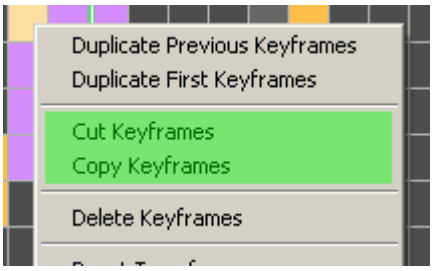
Figure 5-52 Duplicating Keyframes



Copying and Pasting Keyframes

You can copy and paste keyframes, even between bones. To do so, select a range of keyframes, right-click and select Copy Keyframe from the context menu. To remove the keyframes and paste them elsewhere, use the Cut Keyframe selection.

Figure 5-53 Copy and Cut Keyframe



To paste the copied or cut keyframes, select another frame, right-click, and select Paste from the context menu.

Figure 5-54 Paste Keyframe

If your selection of keyframes will be pasted over keyframes that are already set, you will be asked to confirm that you want to overwrite the old keyframes.

Figure 5-55 Paste Confirmation

Paste Keyframe(s)
Pasting keyframes here will overwrite some of your previously set keyframes. Are you sure you want to do this?
Yes
No

Windows Keyboard Shortcuts:

- `Ctrl + C`: Copy keyframes
- `Ctrl + X`: Cut keyframes
- `Ctrl + V`: Paste keyframes

Mac Keyboard Shortcuts:

- `Cmd + C`: Copy keyframes
- `Cmd + X`: Cut keyframes
- `Cmd + V`: Paste keyframes

You can set which properties are copied and pasted for each keyframe in the Settings Window. Refer to Copy and Paste Property Selection for more information.

Inserting Frames

You can insert frames anywhere in the timeline to shift keyframes forward in time. All keyframes to the right of where you insert will be moved to the right. If you select multiple frames, then the keyframes will be moved multiple frames forward.

Figure 5-56 Inserting Frame

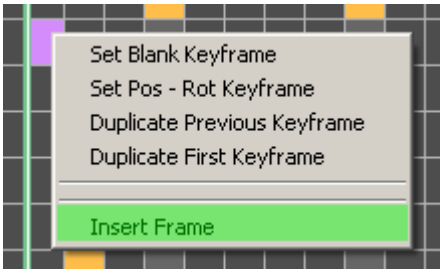


Figure 5-57 Before Insert

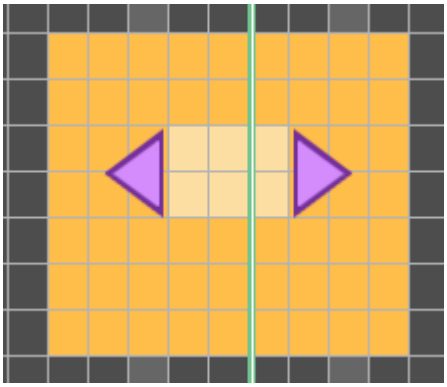
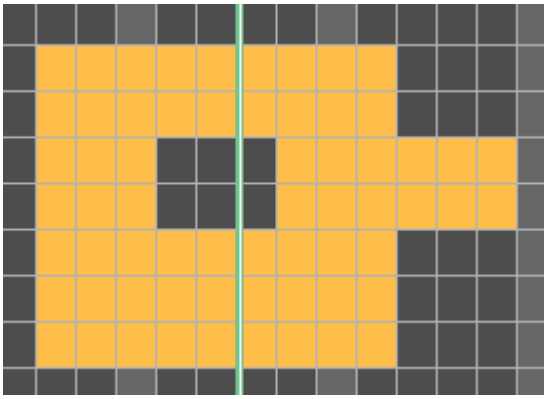
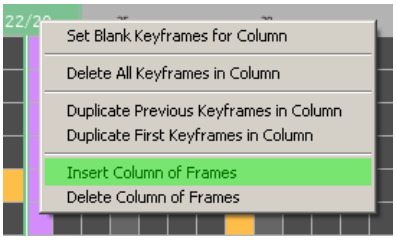


Figure 5-58 After Insert



You can also insert an entire column of frames, shifting keyframes in every bone forward in time. To insert a column of frames, right-click on the timeline's frame header section and select Insert Column of Frames.

Figure 5-59 Insert Column of Frames


Set Blank Keyframes for Column
Delete All Keyframes in Column
Duplicate Previous Keyframes in Column
Duplicate First Keyframes in Column
Insert Column of Frames
Delete Column of Frames

Deleting Frames

You can also shift keyframes backward, to the left by deleting frames. The number of frames shifted will be the number of frames selected.

Figure 5-60 Before Delete Frames

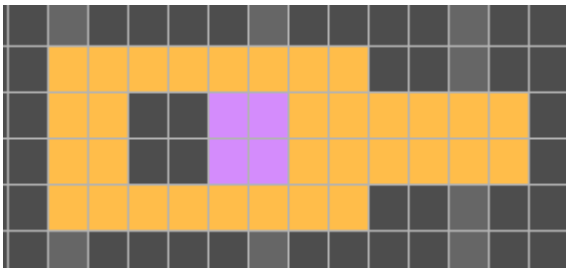
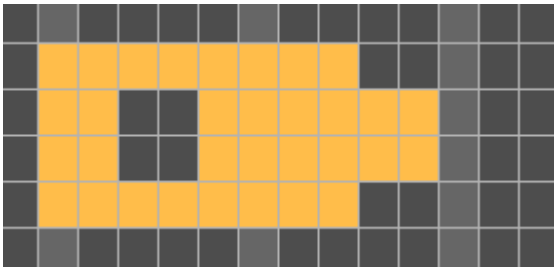
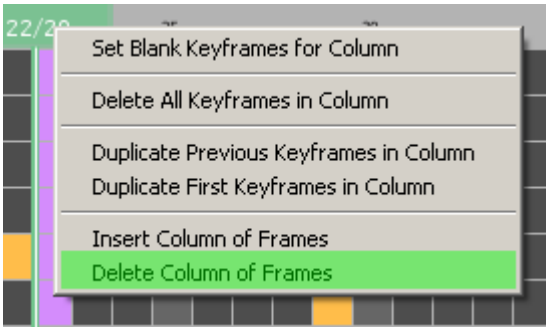


Figure 5-61 After Delete Frames



You can also delete an entire column of frames, shifting keyframes backward in every bone within an animation clip.

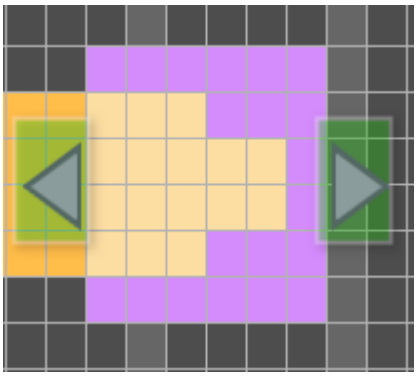
Figure 5-62 Delete Column of Frames


Set Blank Keyframes for Column
Delete All Keyframes in Column
Duplicate Previous Keyframes in Column
Duplicate First Keyframes in Column
Insert Column of Frames
Delete Column of Frames

Shifting Keyframes

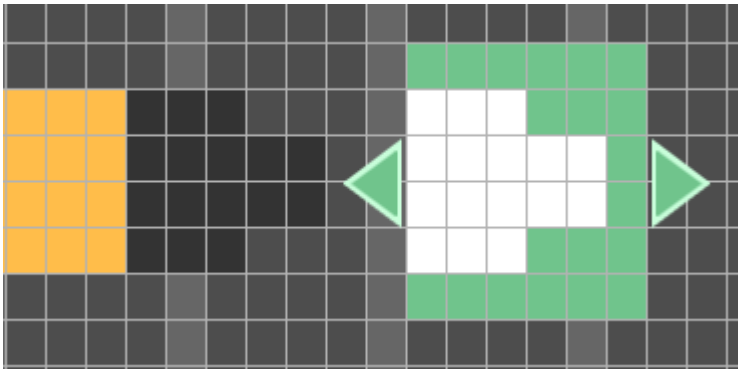
You can quickly shift keyframes back and forth by selecting a range of keyframes, then dragging left or right on the arrows surrounding your selection.

Figure 5-63 Shifting Keyframes Start



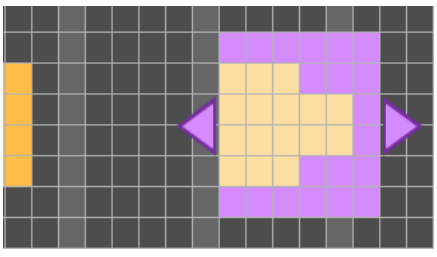
While shifting keyframes, the frames you've selected will be highlighted light green. The keyframes you've selected will be highlighted white. The frames that the keyframes are being moved from will be darkened.

Figure 5-64 Shifting Keyframes



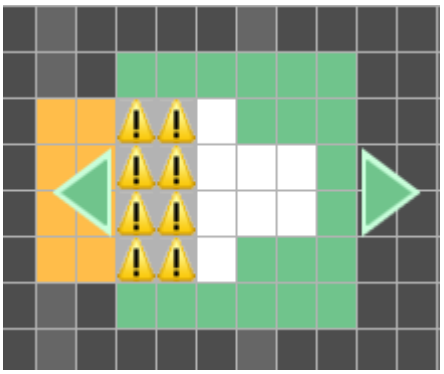
To drop the keyframes, just release the mouse button.

Figure 5-65 Shifting Keyframes End



If the position where you will be dropping the keyframes is already occupied by other keyframes, then a warning icon will be displayed in each keyframe that is going to be overwritten.

Figure 5-66 Shifting Keyframes Warning



If you decide to overwrite the keyframes, you will be asked to confirm that action.

Figure 5-67 Shifting Keyframes Confirm

Windows and Mac Keyboard Shortcuts:

- Esc: Stops the shifting and returns the keyframes back to where they started

Scrolling the Timeline Window

You can scroll the timeline back and forth using the controls at the bottom of the window.

To move forward a frame, click the single arrow pointing right:

Figure 5-68 Move Forward One Frame

To move backward a frame, click the single arrow pointing left:

Figure 5-69 Move Backward One Frame

To freely scroll the timeline backward and forward, use the horizontal slider:

Figure 5-70 Freely Scroll Timeline

To skip to the last keyframe that is set for an animation clip, click the double arrow pointing right:

Figure 5-71 Skip To Last Used Keyframe

To skip to the first frame in the animation clip, click the double arrow pointing left:

Figure 5-72 Skip To Beginning Frame

Cleaning Up

If you have a lot of blank keyframes set and want to remove them to keep a clean workspace, you can quickly remove them all with the trashcan icon at the bottom of the Timeline window.

Figure 5-73 Cleanup Blank Keyframes

Scrubbing

You can scrub your animation back and forth by clicking and dragging the green box in the Timeline header. This lets you quickly see the motion of your animation backward and forward.

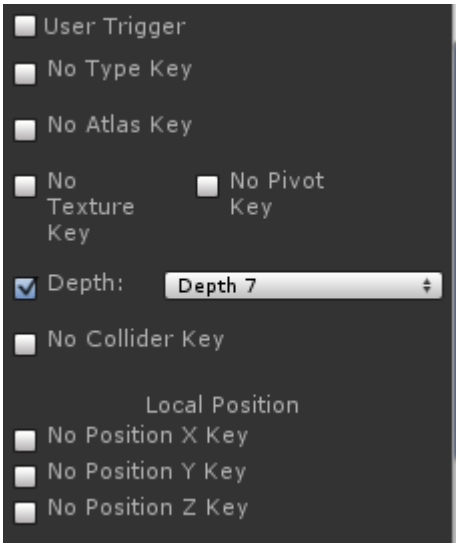
Figure 5-74 Scrubbing

5.8 D: Keyframe Properties

The Keyframe Properties window is where you will set all the properties for a single keyframe, such as position, rotation, scale, texture, depth, colliders, etc.

Keyframes do not need all of their properties set. You can choose which properties of a keyframe to use by toggling the checkbox to the left of each property.

Figure 5-75 Choose Keyframe Properties



The only exception to this is that frame zero for all animations, all bones needs to have all of its properties set.

Keyframe Information

At the top of the properties window is a box containing some information about the selected keyframe, namely the animation clip name, the bone name, and the frame where the keyframe exists.

Figure 5-76 Keyframe Information

User Trigger

A keyframe can fire a user trigger which simply sends a signal back to your code at a specific point in the animation. You can use this signal to perform your own game logic. To set the user trigger to fire, be sure the checkbox is checked.

Figure 5-77 User Trigger

A good example of how this can be used is with sound effects. You may want to have a sound play at a particular point in your animation.

Check out the demo package or video tutorials at echo17.com for an explanation on how to process a user trigger.

Type

The keyframe type determines whether the bone will show a texture or not. If the type is set to Image, then the bone will display a texture. If the type is set to Transform Only, then the bone will effectively be hidden for this keyframe until another Image keyframe is hit.

A transform only type can still be used to move, rotate and scale child bones that do or do not have textures on them. A transform only keyframe can also use colliders without the need for a texture.

The keyframe type determines what properties are available. The Transform Only type has fewer properties since it does not have any images to process.

Figure 5-78 Type

A bone can switch between Transform Only and Image throughout an animation clip. This can be useful if you want to hide and show a bone during an animation clip.

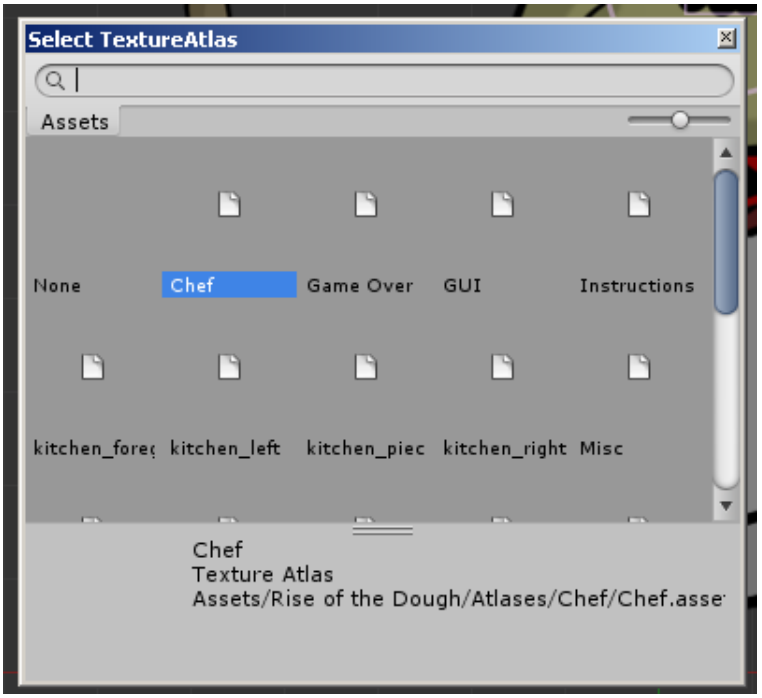
Atlas

If your keyframe type is set to Image, then you can set an atlas. The atlas is a collection of textures grouped together to reduce draw calls at runtime.

Figure 5-79 Atlas

When you click on the circle to the right of the atlas, you will be presented with a pop up window that will let you select your atlas from those in your project. Changing your atlas, will change the textures that are available for the bone's keyframe.

Figure 5-80 Select Atlas



For more information on Atlases, please see 3. Atlas Editor.

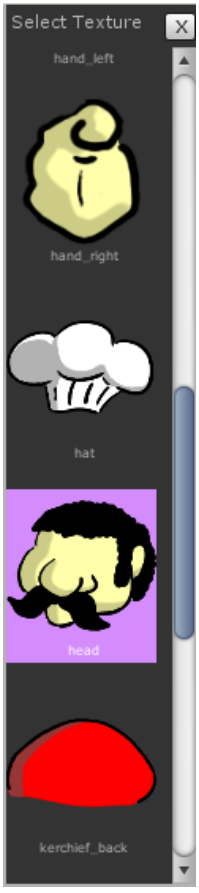
Texture

If your keyframe type is Image, then you can set the texture for your bone.

Figure 5-81 Texture

To set the texture, click on the texture button. This will open a window that lets you scroll through the textures in the selected atlas. The currently selected texture is highlighted with a purple background.

Figure 5-82 Select Texture



Textures are arranged in alphabetic order for quick look ups. To close the texture selection window, click on the X button in the upper right corner.

Figure 5-83 Close Texture Window

You can create traditional sprite animations by setting a different texture on multiple keyframes for a bone. A traditional sprite animation is just a sequence of images played over time to give the illusion of movement, similar to a motion picture film. These sprite animations can be played in conjunction with the motion, rotation, and scale of the bone animation for interesting effects.

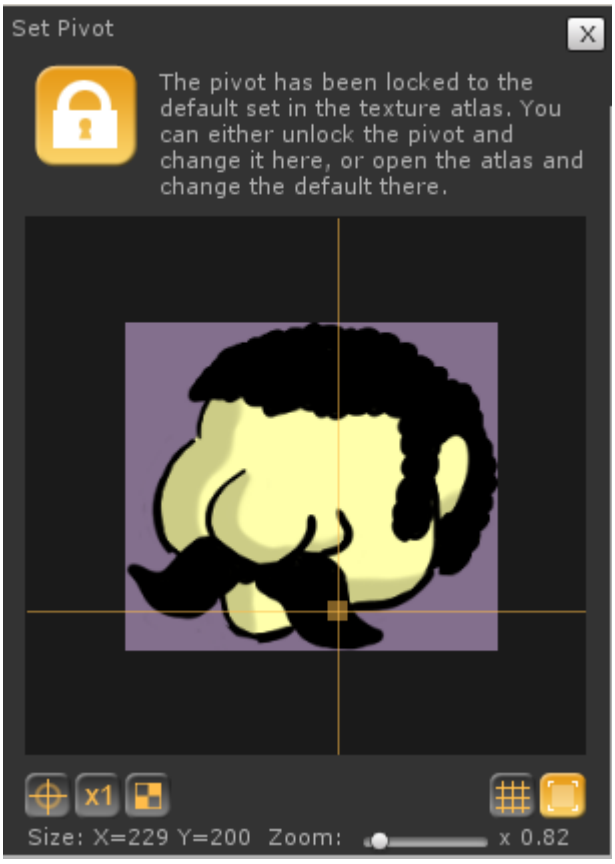
Pivot

If your keyframe is type Image, you can set the pivot offset of the texture.

Figure 5-84 Pivot

To set the pivot, press the Pivot button. This will open up the pivot editor window.

Figure 5-85 Pivot Offset Editor


Set Pivot
The pivot has been locked to the default set in the texture atlas. You can either unlock the pivot and change it here, or open the atlas and change the default there.
x1
Size: X=229 Y=200 Zoom:
x 0.82

If you want to use the pivot offset set in the atlas editor, be sure the Pivot Lock button is on (glowing orange with the lock icon closed).

Figure 5-86 Pivot Offset Locked to Default

If you want to override the pivot offset set in the atlas editor, be sure the Pivot Lock button is off (not glowing with the lock icon open). Once the lock is off, you can adjust your pivot as necessary.

Figure 5-87 Pivot Offset Unlocked

Using the default pivots set in the Atlas Editor can save a lot of time when animating. It's a good idea to leave the pivots locked to the default, just be sure you have set the pivots in the Atlas Editor before you start animating.

To close the Pivot Offset window, click the X button in the upper right corner.

Figure 5-88 Close Pivot Offset Window

For more information on how to set the pivot offset, please refer to 3.5 Pivot Editor.

Depth

If your keyframe type is Image, you can set the depth. The Depth is the order in which your bones will be rendered. Higher depths will be rendered first. Depth zero will be rendered last.

Figure 5-89 Depth

You can change your bone's depth throughout an animation to shift bones to the foreground and background dynamically.

Depth will work even when your animation is rotated in the opposite direction, rendering your bones in order. This allows you to save on the number of animations by not needing to animate a forward and backward pose.

Collider

You can set colliders on both Image and Transform Only keyframes. A collider lets your bones interact with other colliders in your scene. This can be good for weapons or other interactions.

Figure 5-90 Collider

Colliders will appear in the Animation Window as a light green wireframe box or sphere.

There are three collider types:

- **None**: Collider is turned off. This is useful if you don't want your bone to have a collider or you are wanting to turn a collider off on a keyframe after it has been turned on earlier.
- **Box**: A standard Unity box collider with center and size in three dimensions.
- **Sphere**: A standard Unity sphere collider with center and radius in three dimensions.

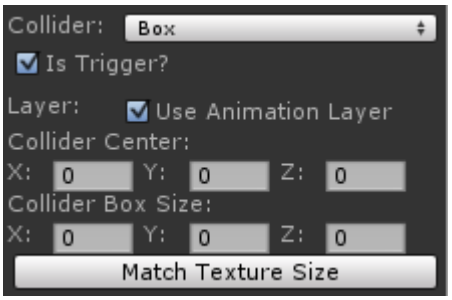
None Collider

Having no collider is useful for:

- Never having a collider set for a bone. If this is desired, set None on frame zero of your bone (default).
- Turning off a collider that was perviously set on a bone. This can be useful if you don't want your collider constantly on. For example, you may have a collider on a weapon bone that you wouldn't want to be on while walking around, but you would want turned on while swinging the weapon.

Box Collider

Figure 5-91 Set Box Collider



Is Trigger: This is set if you want your collider interactions to be handled like a trigger.

Layer: This controls what Unity layer the collider will be on, and more specifically what layer your bone will be on for this keyframe. You can use layers to control which colliders interact with each other. If the Use Animation Layer is set to true, then whatever layer your animation is set to will be used for this keyframe. If this is set to false, you can select your layer from Unity's list of layers. Filtering your physics layer interactions can help prevent unwanted triggers from processing.

Collider Center: This is the offset of the collider relative to your bone's position. This offset is in three dimensions, so you have more flexibility on how it will interact with your scene.

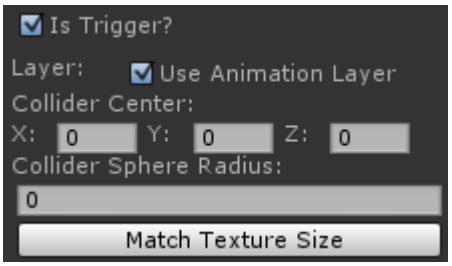
Collider Box Size: This is the size of the box collider along the x, y, and z axis. The size is in three dimensions, so you have more flexibility on how it will interact with your scene.

Match Texture Size: Pressing this button will make the x and y sizes of the box collider attempt to fit to your texture. Note that if your texture has a lot of empty space, the box collider may appear too large.

For more information on box colliders, please see the Unity documentation on Box Colliders and Layer Collision.

Sphere Collider

Figure 5-92 Set Sphere Collider



Is Trigger: See Is Trigger in the Box Collider section above.

Layer: See Layer in the Box Collider section above.

Collider Center: See Collider Center in the Box Collider section above.

Collider Sphere Radius: This is the radius in three dimensions for the size of the sphere collider.

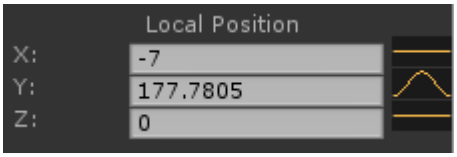
Match Texture Size: Pressing this button will make the radius attempt to fit your texture. Note that if your texture has a lot of empty space, the sphere collider may appear too large.

For more information on sphere colliders, please see the Unity documentation on Sphere Colliders and Layer Collision.

Local Position

The local position will generate animation curves for the x, y, or z (or all three) positions of your bone. The local position is relative to the position of the bone's parent bones.

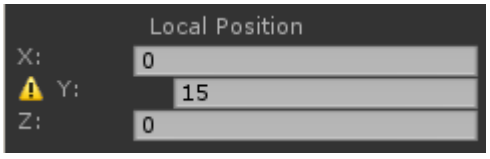
Figure 5-93 Local Position



If you change a property that generates an animation curve, you may receive a warning icon. This is telling you that the property needs at least two keyframes set to generate the animation curve. If you do not set another keyframe for this property, then your settings will not be seen in your animation while playing.

You may want to not generate an animation curve for a particular property. By not having two keyframes for an animation curve property you will be able to manually control that property in code. Otherwise Unity will take over and play the animation with the curves generated here.

Figure 5-94 Keyframe Warning



You can adjust animation curve properties with the Animation Curve Editor by clicking on the animation curve icon next to the property.

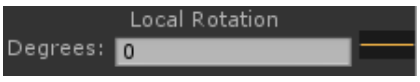
Figure 5-95 Animation Curve Button

For more information on adjusting the animation curve, see 6. Animation Curve Editor.

Local Rotation

The local rotation will generate an animation curve for the z axis of your bone. This rotation is relative to the rotation of the bone's parent rotation.

Figure 5-96 Local Rotation

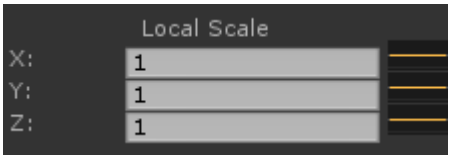


Unity rotations are expressed as quaternions, so even though you are entering the rotation as a euler angle, it will be translated to a four component (x, y, z, w) quaternion. Because of this, the quaternion curve is interpolated. You may notice that some instantaneous jumps in the euler z angle will not occur with the quaternion since the sample rate may be lower than your animation's changes.

Local Scale

The local scale will generate animation curves for the x, y, and z scale components of your bone. This scale is relative to the scale of the bone's parent. Using the local scale will also scale all child bones.

Figure 5-97 Local Scale



If you just want to scale the bone's image and not its children, use the Image Scale properties instead.

Image Scale

The image scale will generate animation curves for the x and y scale of your bone's texture. This scale can be affected by the local scale of the bone and the scale of the bone's parents. Image scale will not affect a bone's children.

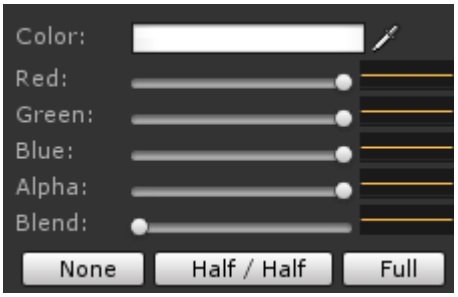
Figure 5-98 Image Scale

If you want to scale a bone's children as well, use the Local Scale properties instead.

Color

As well as setting the mesh color and bone color, you can set the color of a bone on a keyframe basis. The keyframe color has the highest priority, so it will override the mesh and bone colors if your blending weight is set to 1.0f. Inversely, if your blending is set to zero, your keyframe color will not be used.

Figure 5-99 Color



You can set your color using the color dropper, color selector, or by sliding the red, green, blue, and alpha colors individually. If you want to enter the float values of the rgba values, you can open the color selector and set them there. Unlike the other animation curve properties, the color property has to have animation curves for all the color elements. For example, you cannot just have a red color curve, but instead you have to have all four components set.

The blend property tells your animation how much weight to assign this color. A full blend of 1.0f will make this keyframe color override the bone and mesh colors completely. A blend of 0.5f will make this keyframe color blend halfway with the mesh and bone colors. Three shortcut buttons exist for setting often-used blend settings: None, Half/Half, and Full.

In order for the keyframe colors to show while animating, be sure the Update Colors toggle is set to true on your bone animations in the scene.

See the FAQ for more information.

For more information on color blending, please see 7. Color And Lighting.

5.9 E: Animation Window

The animation window allows you to visually change your keyframe properties. It also lets you preview the selected animation clip.

Axis and Grid

The Animation Window shows the x and y axis. The z axis cannot be shown in the 2D editor. The x axis is colored red and the y axis colored green. You can set the thickness of the axis in the settings window from the Animation Controls section.

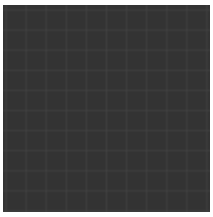
Figure 5-100 Axis

See Axis Thickness for more information on setting the axis thickness.

The grid gives you a reference for your animating. You can change the grid interval or turn it off

completely in the settings window from the Animation Controls section.

Figure 5-101 Grid



See Show Grid for more information on setting the grid size.

Navigating

To move around the Animation Window, click and drag with the middle mouse button.

To zoom in or out in the Animation Window, scroll the middle mouse wheel.

Windows Keyboard Shortcuts:

- `Windows Button + Left Mouse Button`: Move around Animation Window

Mac Keyboard Shortcuts:

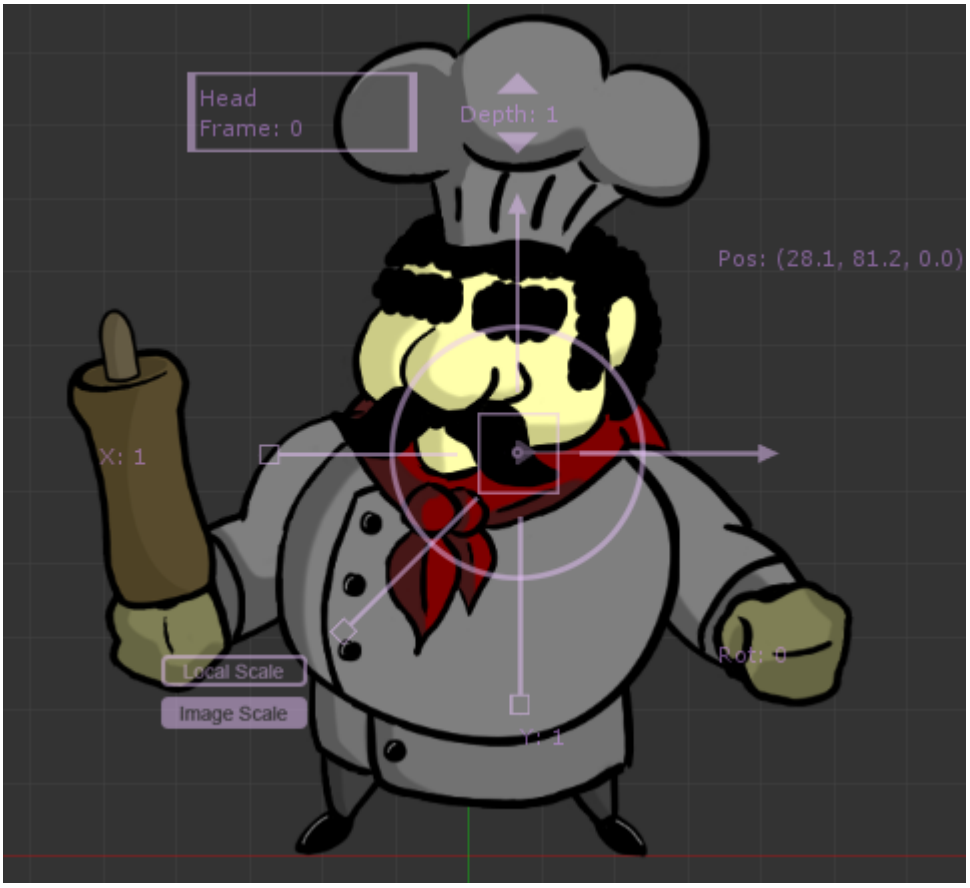
- `Apple Button + Left Mouse Button`: Move around Animation Window

Selected Keyframe Information

When you select a keyframe in the Timeline, the Animation Window will display information about the keyframe surrounding the bone. You can turn off this information in the settings window from the Animation Controls section.

See Show Gizmo Labels for more information on showing the gizmo labels.

Figure 5-102 Keyframe Information



When a bone is selected, it will be a brighter color than the other bones, or more specifically, the other bones are darkened to make the selected bone stand out. You can adjust this darkening effect in the settings window from the Animation Controls section.

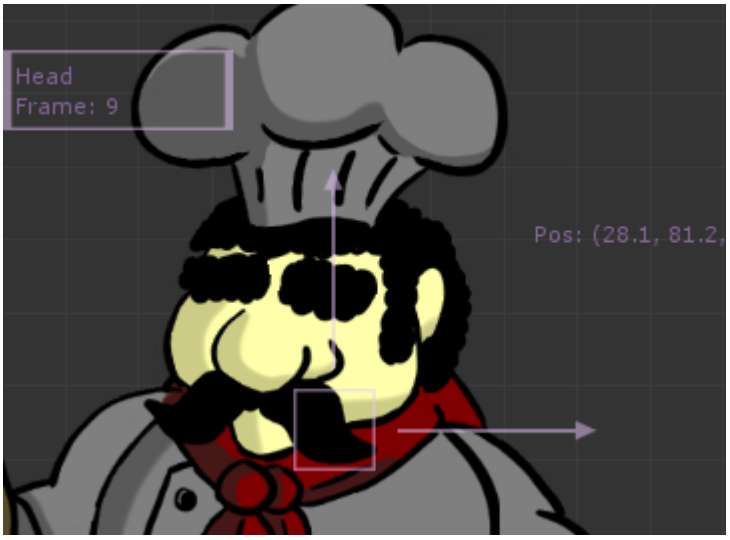
See Non-Selected Bone Darken for more information on darkening the non-selected bones.

Gizmos

There are a few gizmos for the Animation Window that will allow you to manipulate your bones. These gizmos are similar to the Unity gizmos used in the scene editor and allow you to move, rotate, scale, and change your bone depth.

Move Gizmo

Figure 5-103 Move Gizmo

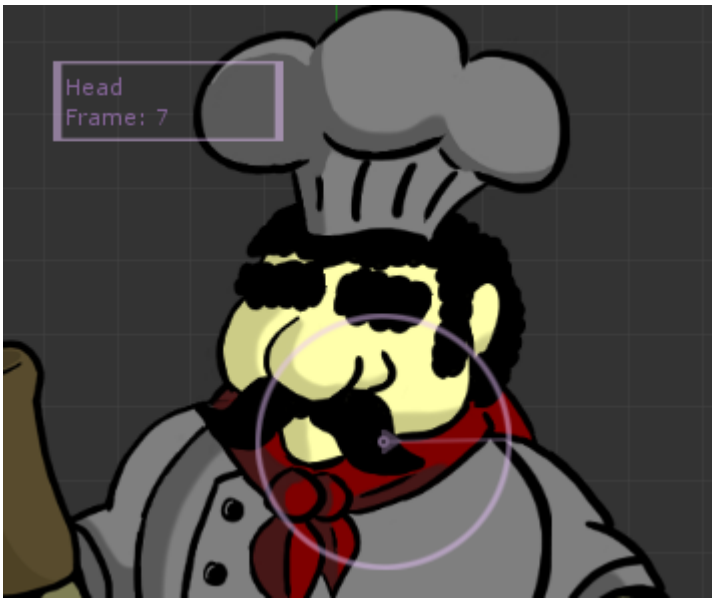


To move a bone in the Animation Window, click and drag either the move arrows or the move box. If you drag the vertical arrow, you will move the bone along the y axis. If you drag the horizontal arrow, you will move the bone along the x axis. If you drag the box, you will simultaneously move the bone along the x and y axis freely.

If you only have one of the x or y position properties set, then you will only see one arrow and no box. The z position cannot be set in the Animation Window.

Rotate Gizmo

Figure 5-104 Rotation Gizmo

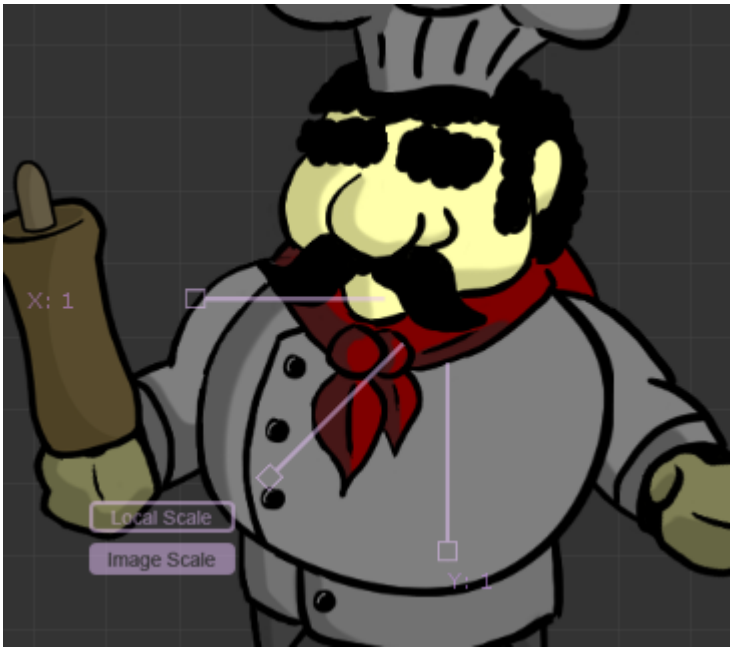


To rotate a bone, click the circle and drag in any direction. The faint purple line connecting the center of the rotation gizmo to the outer ring shows you where the relative zero degree line is.

Local Scale and Image Scale Gizmos

Figure 5-105 Local Scale Gizmo

Figure 5-106 Image Scale Gizmo



The local scale and image scale gizmos are identical, except for the buttons that let you switch between the two scale properties. To scale, click and drag on one of the handles. Click and drag on the horizontal handle to scale on the x axis. Click and drag on the vertical handle to scale on the y axis. Click on the slanted handle to scale both the x and y axis simultaneously.

If you only have one of your x or y scale properties set, then you will only see one handle and no diagonal handle.

Be sure you are scaling the correct property by checking the Local Scale / Image Scale buttons.

Depth Gizmo

Figure 5-107 Depth Gizmo

The depth gizmo lets you change the order of the bone textures visually. To move the bone upwards, toward a higher depth, press the up arrow button above the depth setting. To move the bone lower, toward a lower depth, press the down arrow button below the depth setting.

Adding a Keyframe Visually

If you click on a bone in the Animation Window that does not have a keyframe set for the current time, you will be prompted to add a keyframe at this time frame. If you choose this, a new keyframe will be added for the bone and the position / rotation properties will be set.

Figure 5-108 Add Keyframe Animation Window

5.10 F: Animation Clip Settings

The animation clip settings let you modify the properties of the currently selected animation clip.

Figure 5-109 Animation Clip Settings

Animation Clip Name: Displays the name of the currently selected animation clip.

FPS: (Frames Per Second) Allows you to speed up or slow down an animation.

The FPS is actually the speed of the animation clip in the Animation component attached to your bone animation in the scene. If you want to reference the normalized speed, you should reference the speed of the *bone animation* component and not the animation component.

See FAQ for more information.

Wrap Mode: This determines how the animation clip should behave when it reaches the end.

- Loop: The animation clip will start over from the beginning.
- Once: The animation clip will stop once it has played.
- Clamp: The animation clip will play to the last frame and keep playing the last frame.
- Ping Pong: The animation clip will reverse itself once it reaches the end. It will reverse itself again once it reaches the beginning.

Mix Animation: This allows you to play the animation on top of another animation. This will also toggle the mixing switches on the bone hierarchy when this is set to true.

For more information on setting bone mixing, see Mixing Bones.

Blend Mode: This tells Unity how to blend this animation with other animations.

- Blend: Sets the animation to blend evenly with other animations, determined by the blend weight.
- Additive: Sets the animation to add its curve property values to other animations, determined by the blend weight.

Layer: The animation layer determines priority when blending and mixing. If the animation clip is to play on top of another clip, the layer should be set higher.

Blend Weight: The blend weight determines how much of an animation's curve properties should be used when blending and mixing animations. Higher blend weights give more priority to this animation clip.

For more information on blending and mixing animations, layers, and blend weight, refer to Unity's documentation on Character Animation and Animation Scripting.

5.11 G: Animation Controls

The animation controls allow you to preview an animation and toggle settings for the editor.

Previewing an Animation

You can use the Play / Stop button to start and stop an animation preview. While the animation is being previewed, all other functions are disabled to prevent changing the animation.

To advance one frame backward or forward, use the arrow buttons to the left or right, respectively.

Figure 5-110 Preview Animation

The real time of an animation is displayed to the right of the animation preview buttons. This shows you how many seconds will have elapsed at the current frame in the animation clip, taking into consideration the FPS.

Figure 5-111 Animation Preview Time

You can leave the Animation Curve Editor window open and adjust its curves while previewing an animation. This allows you to adjust an animation curve and quickly get feedback on the effect.

Animation Editor Settings and Controls

Figure 5-112 Animation Editor Settings

Center Animation: Brings the x and y axis back to the center of the Animation Window.

Zoom x 1: Zooms the Animation Window back to its default setting where one texture pixel equals one pixel in the Animation Window.

Settings: Opens the settings window.

See Settings Window for the different options that can be changed.

Toggle Contrast: Switches the background and gizmo label colors from light to dark so that you can better see your light or dark animation textures.

Animation Window Zoom

Figure 5-113 Animation Window Zoom Slider

Sliding the zoom will adjust the zoom setting in the Animation Window. You can also zoom in the Animation Window with the middle mouse wheel.

Mesh Color

To set the overall mesh color, click on the color swatch or select a color with the eyedropper.

Mesh color is the base color and can be overridden or blended with bone colors and keyframe colors. See 7. Color And Lighting for more information.

Settings Window

The settings window is opened by clicking the gear icon in the Animation Controls section.

Show Gizmo Labels

Toggling this on will show the labels for the selected keyframe in the Animation Window. It will also show the values for the position, rotation, and scale properties if they are set.

Figure 5-114 Show Gizmo Labels

Show Bone Bounds

Toggling this on will place a purple box around the selected bone in the Animation Window. This helps you to see your bone's size and if you have any extra space in the texture.

Figure 5-115 Show Selected Bone Bounds

Figure 5-116 Selected Bone Bounds

Show Grid

Toggling this on will show a network of lines that can be used for placing bones. If you don't want to see this grid, you can turn it off here.

You can set the grid spacing interval in pixels to better fit the animation you are working on.

Figure 5-117 Grid Size

Non-Selected Bone Darken

When you select a keyframe in the Timeline, or select a bone in the Animation Window, all other bones are darkened to make the selected bone standout. You can adjust this darkening factor with the slider.

Figure 5-118 Bone Darken

Axis Thickness

You can adjust the thickness of the axis lines for better visibility. A thickness of zero pixels will make the axis be invisible.

Figure 5-119 Axis Thickness

Copy and Paste Property Selection

When copying and pasting keyframes in the Timeline, only the properties selected here will be pasted. This allows you more control over creating new keyframes without having to waste time removing unwanted copied data.

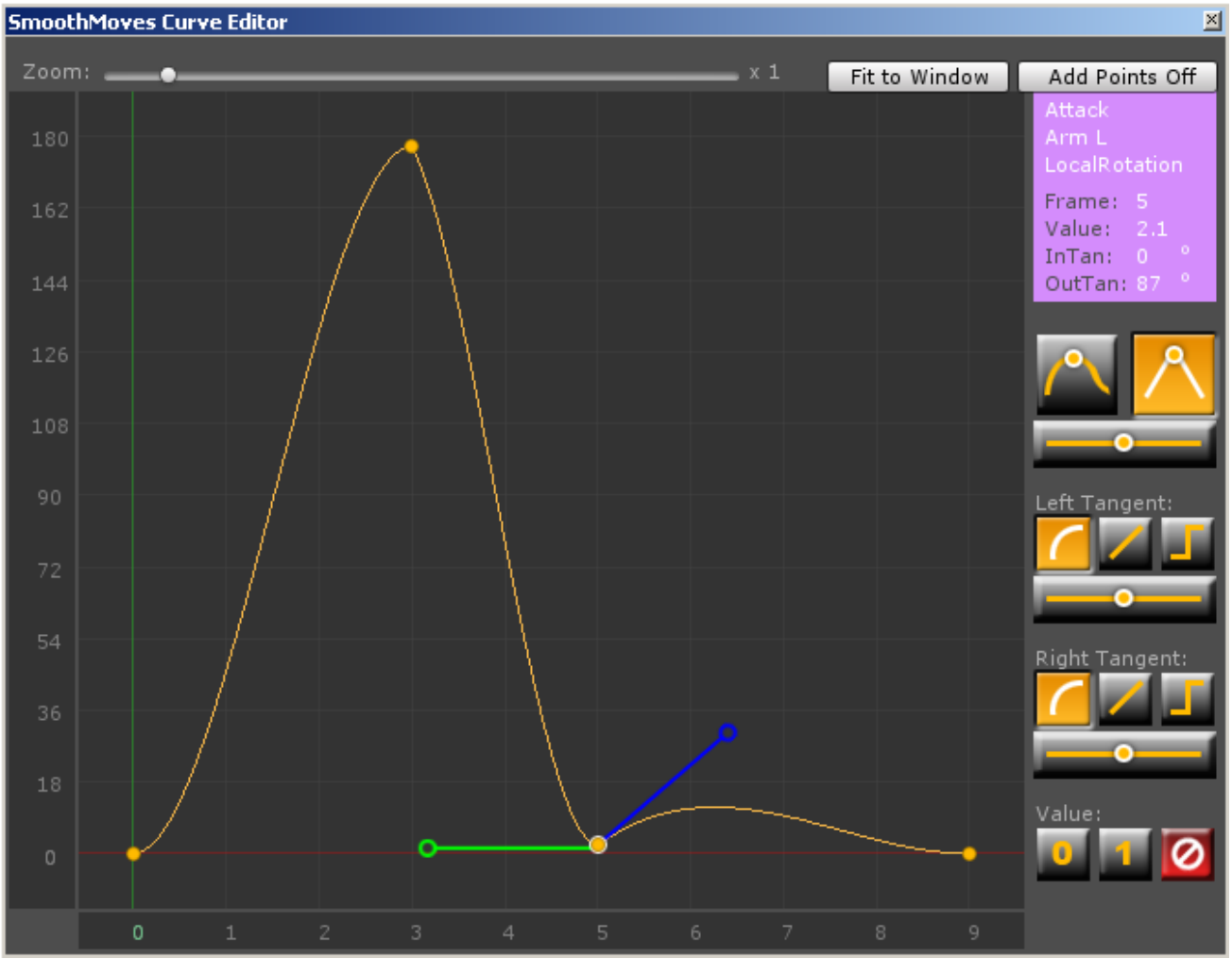
Figure 5-120 Copy Paste

Figure 5-121 Copy Paste Properties

6.

Animation Curve Editor

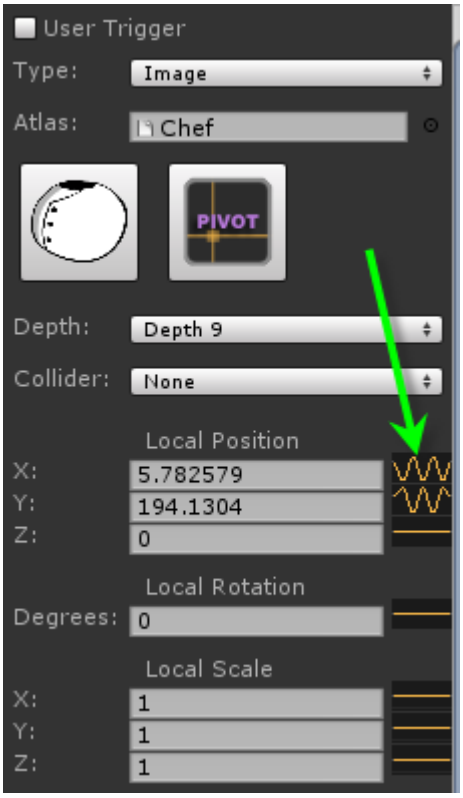
Figure 6-1 Curve Editor



6.1 Opening

To open the curve editor, you will need to click on the curve swatch next to a property in the keyframe properties window of the Animation Editor.

Figure 6-2 Curve Button



6.2 Sections

The animation curve editor is composed of several sections:

- Value Axis
- Frame Axis
- Scale Settings
- Main curve window

- Node Settings

Value Axis

The value axis runs horizontally on the left side of the editor. It shows the value range that the nodes of your curve contain.

Figure 6-3 Values

These values can vary widely, depending on the type of property you are editing. For instance, if you are editing a color curve, then the values will probably range from zero to one. Rotation curves may have something like -120 to 560, or any number possible.

Frame Axis

The frame axis runs vertically along the bottom of the editor. It shows the range of the frames used by this animation curve.

Figure 6-4 Frames

When you move your mouse over the main curve window, you will see the frames highlight green to show you where you are in the timeline.

Scale Settings

You can Zoom the animation window by sliding the zoom vertical bar at the top of the editor.

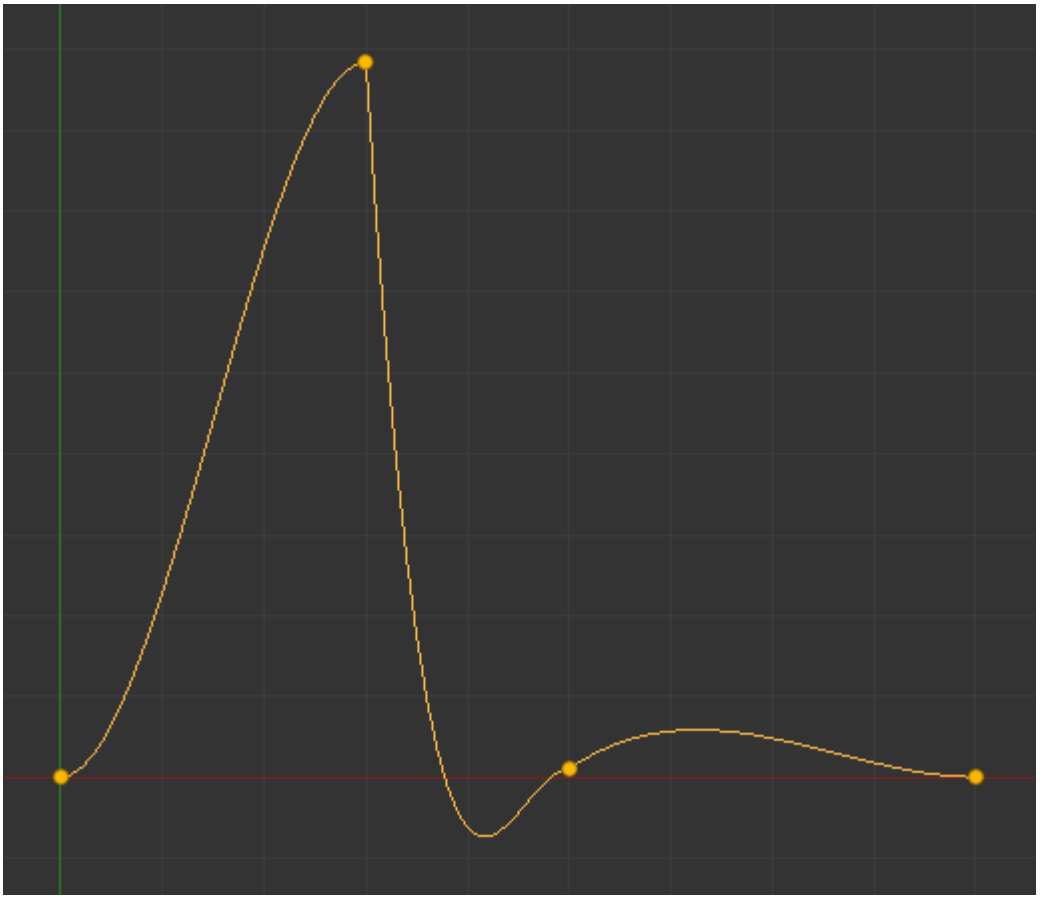
Figure 6-5 Zoom

If you want to quickly show all of the curve in the main curve window, you can click the Fit To Window button to jump to this zoom level.

Figure 6-6 Fit To Window

Main Curve Window

Figure 6-7 Main Curve Window



The main curve window shows the animation curve for the selected property on the selected bone in the selected animation clip. This is where you can select nodes, move nodes around, and adjust node tangents.

Navigating

You can navigate the main curve window just like you would the Animation Editor or Pivot Offset Editor.

To pan around, click the middle mouse button and drag.

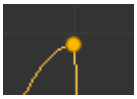
To zoom, scroll the middle mouse wheel.

For more information on navigating, please see Navigating.

Nodes

A node is a keyframe, and more specifically it is the property of the keyframe you have chosen.

Figure 6-8 Node



To select a node, simply click on the circle representing the node.

Figure 6-9 Selected Node

When a node is selected, it will be highlighted with a white ring. You will also see its tangent handles appear for you to adjust.

Moving a Node

When you move a node up and down, you are changing the keyframe property's value. When you move the node left and right, you are changing the frame where the property is set, thus adjusting its timing.

To move a node, drag the node up, down, left, or right, then release to set the new frame or value.

When moving a node left or right, adjusting its frame, the node will snap to the frames of your animation clip. Nodes cannot exist outside of these frames. If the resolution of the frames is not high enough for you, then it might be best to expand your animation clip and

just speed up the FPS. This will give you more frames to work with.

When moving a node left or right, if you drop on a frame that has no keyframe set, a new keyframe will be added automatically and the property turned on. If the frame already has a keyframe, then the property will just be turned on.

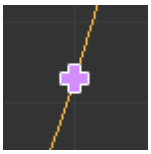
Adding a Node

To add a node, be sure the Add Points On button is toggled on in the upper right corner of the editor.

Figure 6-10 Add Points On

When this is on, you can move your mouse over the curve. Anywhere there is a frame without a keyframe set, the add node icon will appear.

Figure 6-11 Add Node



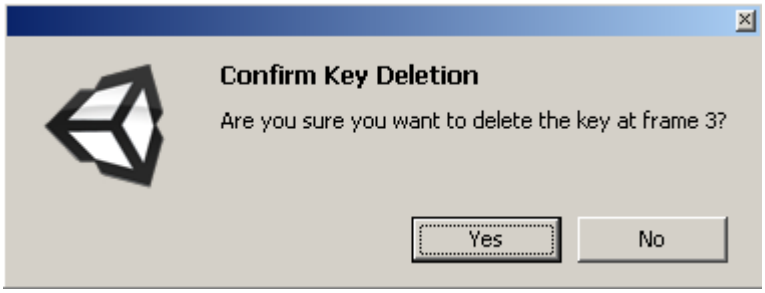
To add the node, click the icon. A new keyframe will be set and this property will be turned on. If there is already a keyframe present, then the property will just be turned on.

Deleting a Node

To delete an existing node, click on the node and press delete node button in the bottom right corner of the editor.

Figure 6-12 Delete Node

Figure 6-13 Delete Node Confirmation



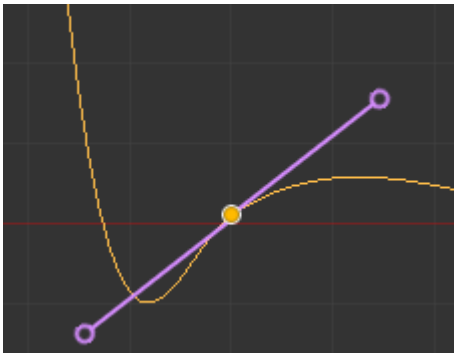
Windows and Mac Keyboard Shortcuts

- `Delete`: Deletes the selected node
- `Backspace`: Deletes the selected node

Adjusting a Tangent

To alter a tangent of a node, click on the handle's circle and drag the mouse up and down. Adjusting the tangent will steepen or smooth a node's curve so that an animation will be more or less exaggerated.

Figure 6-14 Adjust Tangent



If a node is set to smooth, then both the left and right tangents will move together. Tangent handles of this type are colored purple.

Figure 6-15 Smooth Tangents

A broken tangent allows you to adjust the left and right tangents separately. Tangents of this type are colored green for the left tangent, blue for the right tangent.

Figure 6-16 Separate Tangents

Node Properties

When a node is selected, you can adjust its properties on the far right.

Smoothness

If you want your node to be smooth, meaning both the left and right tangents to be equal, then you can set the node type to Smooth.

Figure 6-17 Smooth Tangents

If you want to set the left and right tangents separately, then you will want a node type to be Broken.

Figure 6-18 Broken Tangents

If the node is broken, then another button will appear that will let you equalize the broken tangents. Effectively, this is the same thing as a Smooth node type, but the node remains broken. This is good for quickly setting the node tangents back to an equal state if you have moved them too far away from your goal.

Figure 6-19 Equalize Tangents

Special Tangent Types

If the node type is Broken, then you can set special tangent types for the left or right tangents. There are three special tangent types:

- Free
- Linear
- Constant

Free Tangent

Figure 6-20 Free Tangent

Allows complete freedom to set the tangent how you want.

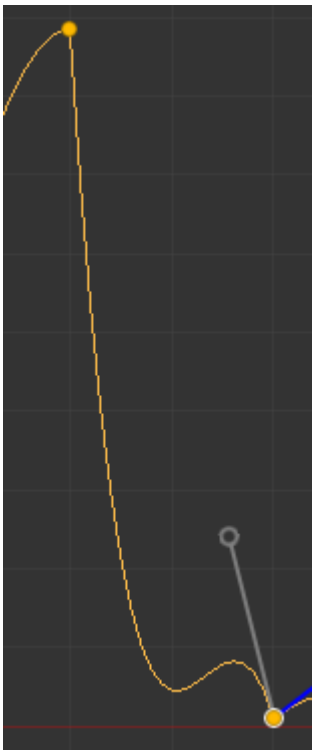
Figure 6-21 Free Tangent Node

Linear Tangent

Figure 6-22 Linear Tangent

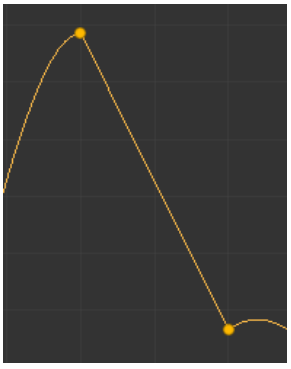
The tangent cannot be set manually, rather it always points to the previous node (for right tangent) or next node (for left tangent). Linear tangents are colored grey.

Figure 6-23 Linear Tangent Node



If the right tangent of one node is set to linear and the left tangent of the next node is set to linear, then the curve between the nodes will be a straight line.

Figure 6-24 Two Linear Tangent Nodes

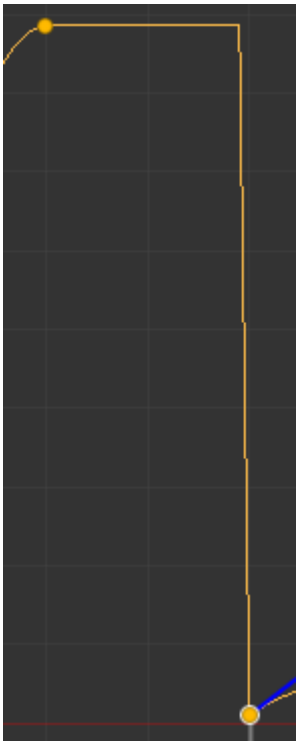


Constant Tangent

Figure 6-25 Constant Tangent

The tangent cannot be set manually. Constant tangents have a value of infinity and allow you to keep a value from changing between nodes.

Figure 6-26 Contant Tangent Node



Node Values

Figure 6-27 Value

At the bottom of the node properties section are some value shortcuts. These allow you to quickly set your node value to zero or one, two very common property values. Obviously, these values aren't useful for all curve types, but for others like scale or color they can come in handy.

6.3 Adjusting Animation Curve While Previewing

You can leave the Animation Curve Editor open while previewing an animation. This allows you to adjust an animation curve while watching the animation play, giving you a lot of feedback on how your changes will impact the overall flow.

7.

Color And Lighting

7.1 Colors

You can add lots of variety to an animation by using colors. There are three types of colors that can be set in a SmoothMoves animation:

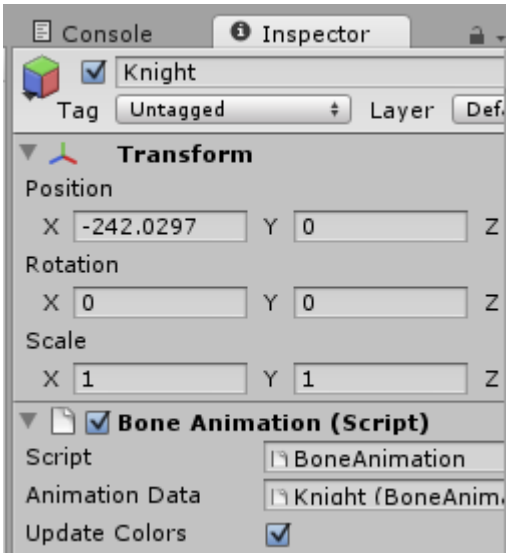
- Mesh Color
- Bone Color
- Keyframe Color

In order for color changes to be processed at runtime, you must toggle the Update Colors setting in your scene bone animations to true.

See FAQ for more information on updating colors.

Update Colors is turned off by default to improve performance of animations that do not need their colors changed at runtime. If you do not need color updates at runtime, it is best to leave this option off.

Figure 7-1 Update Colors



Mesh Color

Mesh color is good for changing the overall look of a mesh. It is a great way to simulate lighting on mobile and other lightweight platforms that don't have the processing power to calculate lights.

You can set the mesh color at runtime in script using the function `SetMeshColor`.

See the API documentation for more information on setting the mesh color.

Bone Color

Bone color is good for giving variety to your animations. You can create black, white, and grey shaded textures in your image editing software (Photoshop for example). In the SmoothMoves animation editor, you can then set your bone colors to give your animations a uniqueness to them. You can also set the bone color in script with the `SetBoneColor` function.

You can also flash bone colors in script using the `FlashBoneColor` function. This can be useful if you want to draw attention to a bone at runtime. For example if your character is taking damage, flashing the bone might show where the damage is being taken.

See the API documentation for more information on setting or flashing the bone color.

In order for bone color flashing to be processed at runtime, you must toggle the Update Colors setting in your scene bone animations to true.

See FAQ for more information on updating colors.

Keyframe Color

Keyframe color is good for animating a color over a period of time. For example, you could have a weapon glow by pulsing its color over the life of the animation clip.

Keyframe color cannot be set at runtime, only in the SmoothMoves animation editor.

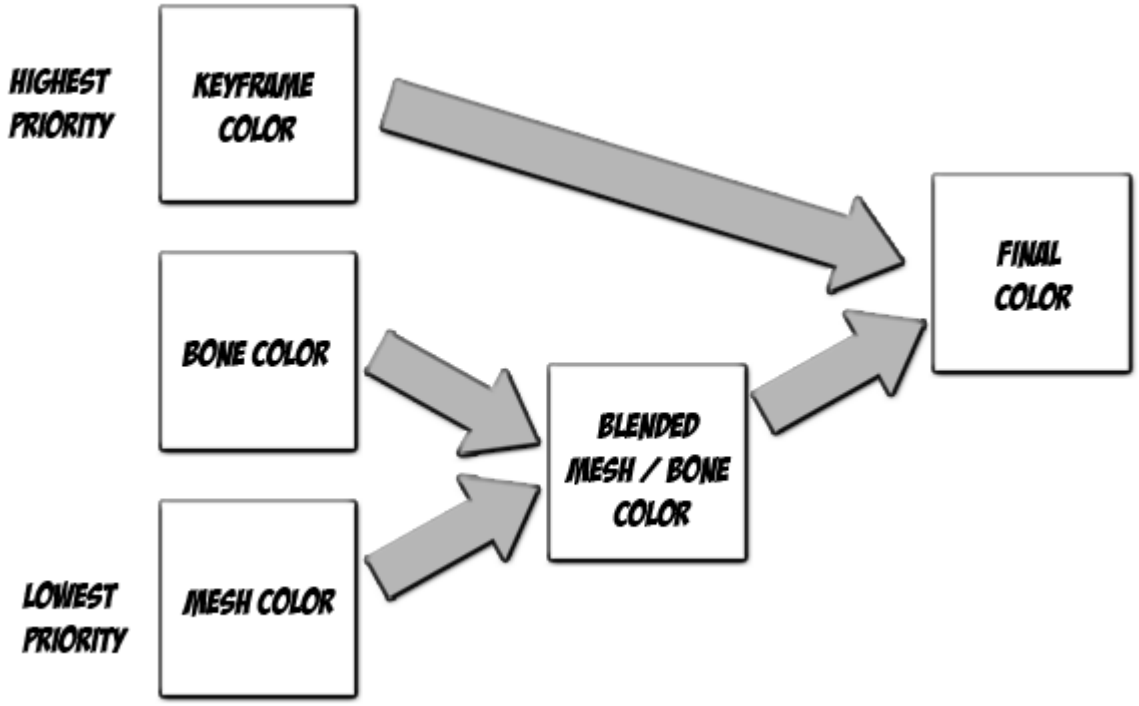
In order for keyframe animated color changes to be processed at runtime, you must toggle the Update Colors setting in your scene bone animations to true.

See FAQ for more information on updating colors.

Color Blending

Colors can be set at the mesh, bone, or keyframe level. The mesh color is the base color. Bone color is higher priority than mesh color and is blended according to the weight of the bone color. Keyframe color is the highest priority and is blended with the result of the mesh / bone color blending according to the weight of the keyframe color.

Figure 7-2 Color Explanation

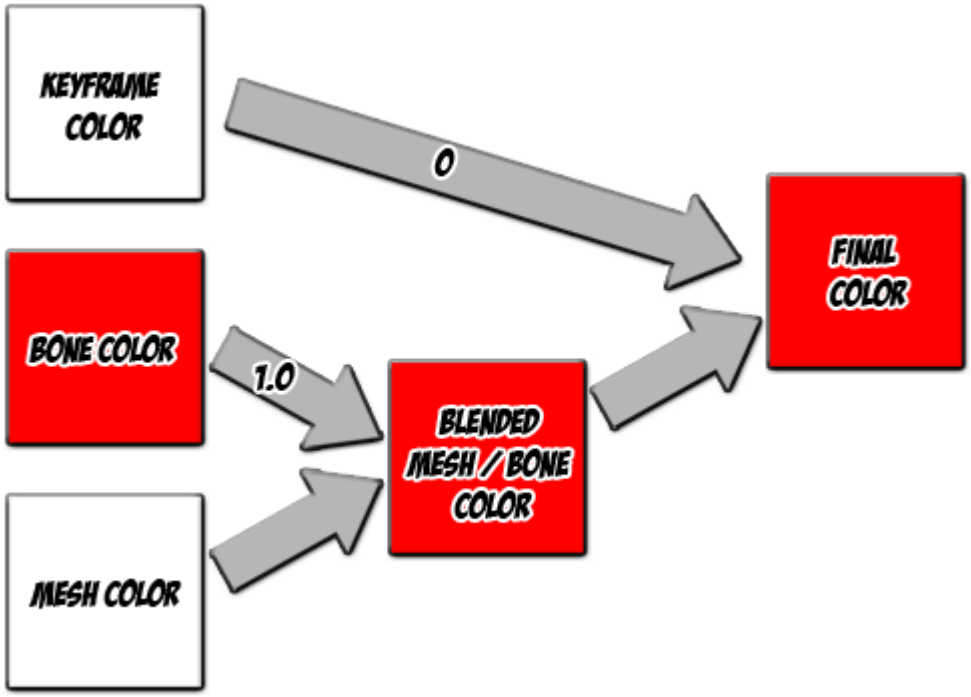


Color Examples

Example #1

- **Mesh Color**: white
- **Bone Color**: red, blending = 1.0f
- **Keyframe Color**: white, blending = 0

Figure 7-3 Ex1



Result:

red

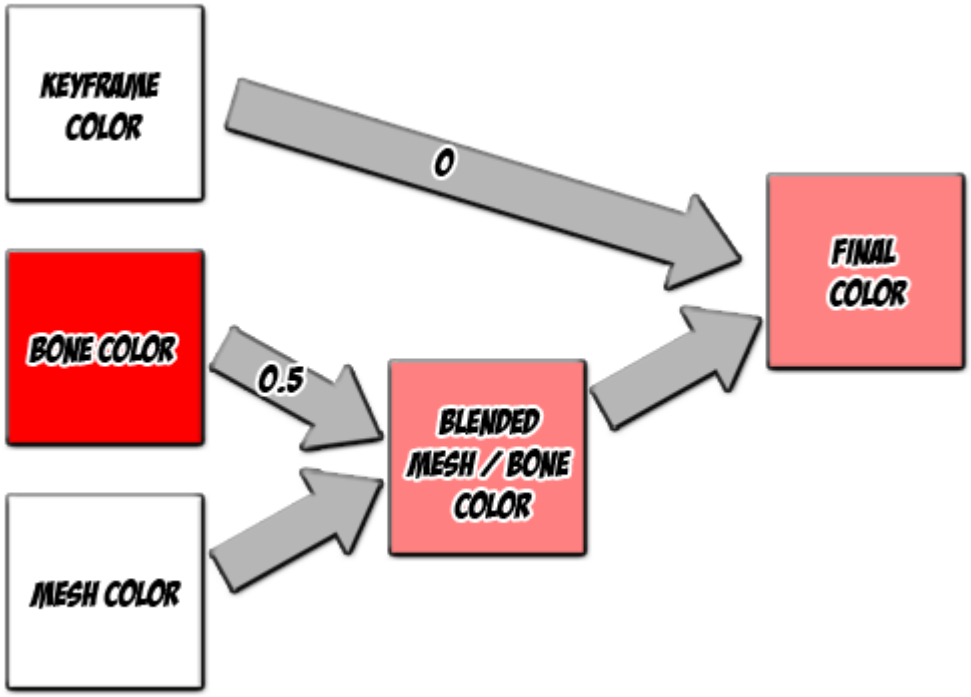
Explanation:

Mesh / Bone color blending = red since the bone blending has the full blend weight set, completely overriding the mesh color. The keyframe color has no effect since its blending is set to zero.

Example #2

- **Mesh Color**: white
- **Bone Color**: red, blending = 0.5f
- **Keyframe Color**: white, blending = 0

Figure 7-4 Ex2



Result:

pink

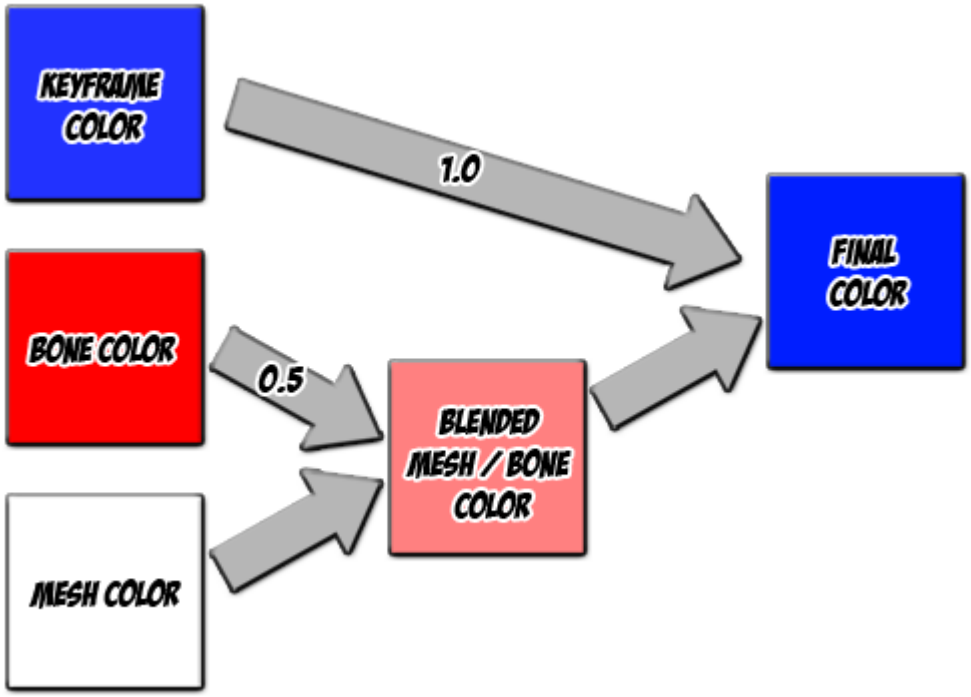
Explanation:

Mesh / Bone color blending = pink since the bone color red is half blended with the white mesh color. The keyframe color has no effect since its blending is set to zero.

Example #3

- **Mesh Color**: white
- **Bone Color**: red, blending = 0.5f
- **Keyframe Color**: blue, blending = 1.0f

Figure 7-5 Ex3



Result:

blue

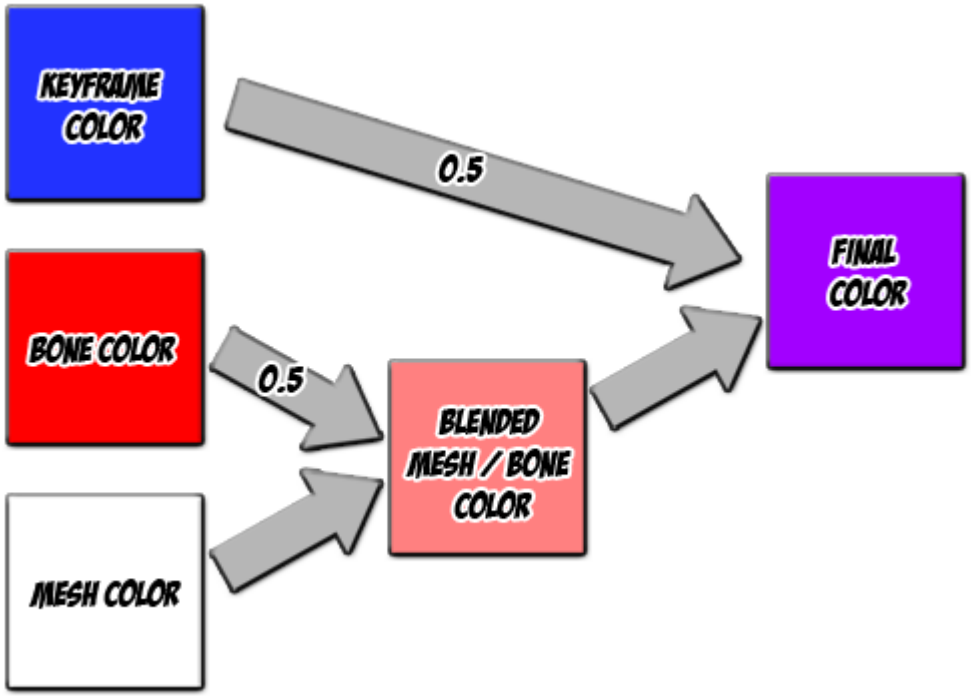
Explanation:

Mesh / Bone color blending = pink since the bone color red is half blended with the white mesh color. The keyframe color completely overrides this since its blending is set to one.

Example #4

- **Mesh Color**: white
- **Bone Color**: red, blending = 0.5f
- **Keyframe Color**: blue, blending = 0.5f

Figure 7-6 Ex4



Result:

purple

Explanation:

Mesh / bone color blending = pink since the bone color red is half blended with the white mesh color. The keyframe color of blue is half blended with pink which yields a shade of purple.

7.2 Lighting

SmoothMoves animation meshes have normals embedded in them, so you can light them just like you would a 3D mesh.

In order to have a mesh be lit, you must be using a shader that can process light. By default SmoothMoves atlas materials are set with the Alpha Blended particle shader. This shader cannot process lighting and is good for scenes where no lighting is being used.

8.

Optimization and Tips

8.1 Sprite Size

If you want your sprites to dynamically batch so that there are fewer draw calls, be sure that:

- All have a transform local scale of 1.0f, 1.0f, 1.0f. The sprite's relative scale and absolute size can be set to anything, just be sure the transform scale is 1.0f.
- All have the same material, which means the same atlas.

8.2 Skinned Mesh Draw Calls

Currently, Unity will not dynamically batch skinned meshes. This means that each of your bone animations will take at least one draw call. If your bone animation contains more than one atlas, then each of your bone animations will take more than one draw call.

SmoothMoves is primarily a skinned mesh skeletal animator. It can be used to generate sprite animations, but if you are only interested in sprite animation, it is recommended that you seek out a plugin that is more appropriate for that. There are numerous sprite packages in the Asset Store that cater to 2D sprite animators. These plugins won't give you the

smooth motions that a skeletal animator will, but you will see better performance due to batching.

If you only have a couple of atlases in your animation, but you are seeing many draw calls, that is probably because your bones depths are set up in a way that causes Unity to alternate between your atlases several times to completely draw the character. If possible, try to put your bones with the same atlases near each other in depth. This will create much fewer draw calls per animation.

8.3 Creating Assets for Older Devices / Multiple Resolutions

You may want to create your game so that older devices will utilize smaller atlas textures. The following process is the best way to accomplish this:

1. Create your source textures in the highest resolution your game will use.
2. Create your high res atlases (which will create the materials and textures).
3. Create your Animations using the high resolution atlases.
4. Duplicate the materials and textures created by your high res atlases. Set the max size of these new textures to a smaller size. These will be your low res textures. Set the low res materials' textures to the low res textures.
5. In your scripts, swap out the high res materials with the low res materials.
6. Add the script to a bone animation, set the properties in the inspector, and Run the game.

The first three steps are covered in this user guide, so only the last three steps will be highlighted here.

4. Create Low Res Materials and Textures

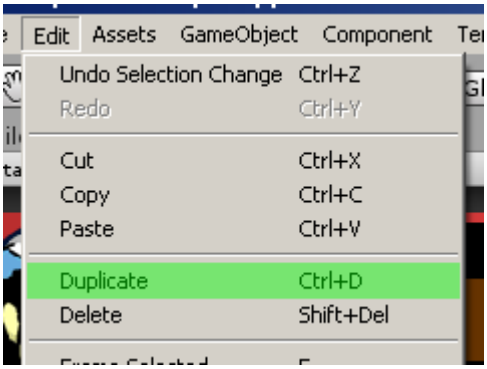
Duplicate the Materials and Textures

Select your high res material and texture in the Project Window.

Figure 8-1 Select Hi Res Material and Texture

From the Unity menu, select Edit > Duplicate.

Figure 8-2 Duplicate



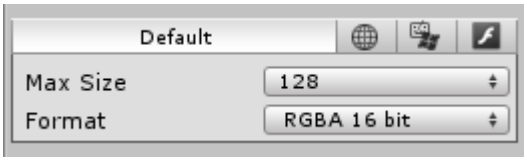
Set the Max Size of your Low Res Textures Smaller

Select your newly duplicated texture.

Figure 8-3 Select Low Res

In the Inspector Window set the Max Size to a smaller number.

Figure 8-4 Max Size



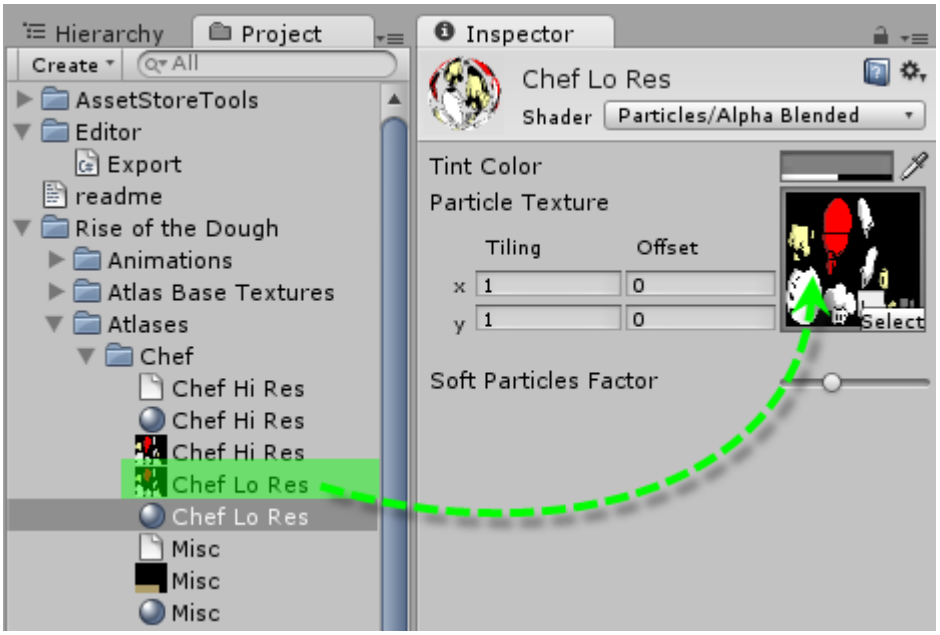
The preview of the image should now show a smaller texture size.

Figure 8-5 Low Res Texture

Set the Low Res Material's Texture to the Low Res Texture

Drag the Low Res Texture to the Low Res Material's texture property.

Figure 8-6 Drag Low Res Texture to Low Res Material



5. Swap Material in Your Script

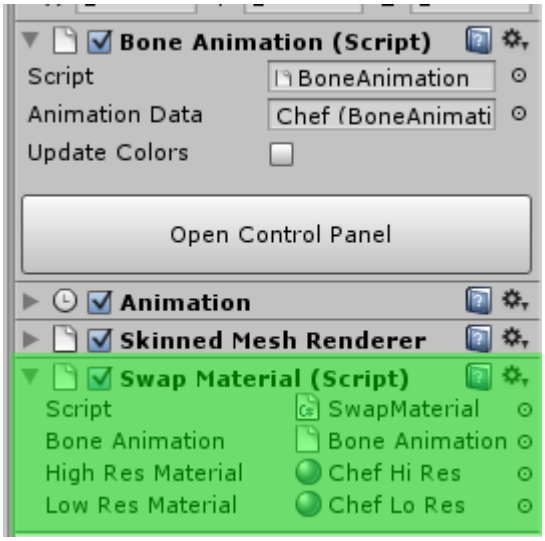
In your script, add references the bone animation and materials you wish to swap. Somewhere in your code, you can then swap the high res materials with the low res materials on your Bone Animation.

```
using UnityEngine;
using SmoothMoves;

public class MyScript : MonoBehaviour
{
    public BoneAnimation boneAnimation;
    public Material highResMaterial;
    public Material lowResMaterial;

    void Start ()
    {
        boneAnimation.SwapMaterial(highResMaterial, lowResMaterial);
    }
}
```

6. Add the Script to a Bone Animation

Select a bone animation and add your new script to the game object. Set the inspector properties of the script to your bone animation and reference the high and low res materials you created.

Figure 8-7 Set Inspector Properties



In your game or scene view you should see the high resolution animation at design time.

Figure 8-8 High Res

When you run the game, your low resolution materials will be swapped in.

Figure 8-9 Low Res

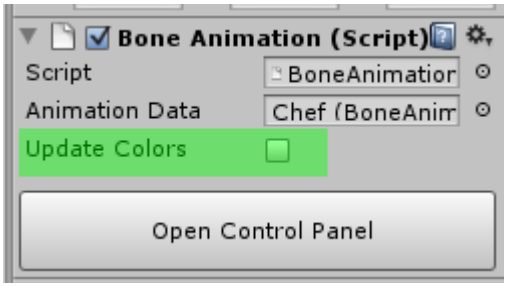
Note that the weapon in this example did not change. This is because it is in a different atlas from the chef. If you want to swap the weapon material as well, you'll need to follow this process for the weapons' atlas, material, and texture.

Note that the animation did not change size, only the resolution of the images. This frees you from having to manually resize all your game assets when switching materials and textures.

8.4 Color and Lighting

SmoothMoves runs most efficiently when not having to process color and lighting on a mesh. This is because the blending calculations required could be quite taxing on the processor every frame. If at all possible, you should limit your color processing time by switching off the Update Colors toggle on the bone animation.

Figure 8-10 update colors



Note that you can switch the color processing on and off at runtime through code. This lets you keep it off when you are not needing to process color and turn it on for the moments when it is necessary.

You can set user triggers in your code to turn color processing on and off.

9.

Redistributing Your Work

9.1 Share Your Work!

SmoothMoves is designed so that you can export your work to be used in other projects. You may also sell your work by exporting the animations and their support files.

Care must be taken so that you don't export too much or you will be violating the license terms of SmoothMoves.

9.2 What to Export

You may export the following files to users without a SmoothMoves license:

- Atlases
- Materials created by the atlases
- Textures created by the atlases
- Bone Animation Data (assets)
- Bone Animations (gameobjects in the scene that use Bone Animation Data)

- SmoothMoves_Runtime.dll (found in the Plugins folder)

You may export your source textures, but it is not necessary. The source textures are only used by the Animation Editor and are not used at runtime. If you are sharing your work with someone that will be modifying the animation, then you should include the source textures in your export.

9.3 What you MAY NOT EXPORT

Exporting the following will be in violation of SmoothMoves license:

- SmoothMoves_Editor.dll (found in the Editor folder)

9.4 Export Process:

To export your work for sale or just to share, you can do the following:

1) Select the items you want to include in your package. This can include any of the following in the list from the What to Export section of this chapter. If you are exporting bone animation data, then you will likely need to also export materials, atlases, and atlas textures used by the bone animation data.

2) Package the items by going to the Unity menu Assets > Export Package.

This creates a Unity package that can be imported into another Unity project.

9.5 Import Process:

To bring a package into Unity:

1) Go to the Unity menu Assets > Import Package > Custom Package.

2) Choose the files you wish to import, most likely this will be all files.

10.

FAQ and Troubleshooting

10.1 Questions

- Q: Why are each of my animations taking at least one draw call?
- Q: Why aren't my sprites dynamically batching?
- Q: I have set colors on my bones or keyframes, so why is the color not updating when I run the scene?
- Q: If I cross fade two animations that switch textures, why do the animation textures change erratically?
- Q: I call Play or CrossFade using the Animation component, but my textures are not switching, my colliders are not turning on / off, and the animation is playing at the wrong speed. What am I doing wrong?
- Q: How can I make a lower resolution animation for older devices without having to create a whole new animation?
- Q: Why do my animations and sprites have artifacts in them?
- Q: Why are my textures cut off in the texture atlas?

10.2 Answers

Q: Why are each of my animations taking at least one draw call?

A: SmoothMoves creates skinned meshes. Unity currently does not batch skinned meshes, so each of your animations will require at least one draw call. If you are using multiple materials in your animation, then each animation will require several draw calls.

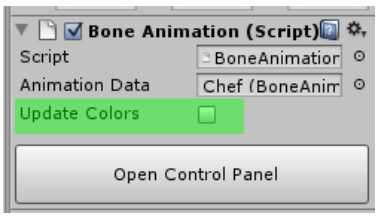
Q: Why aren't my sprites dynamically batching?

Sprites will not batch if either their transform's local scale is different or they are using different materials. If you want your sprites to be different sizes, use the sprite properties Relative Size or Absolute Size instead of the transform scale.

Q: I have set colors on my bones or keyframes, so why is the color not updating when I run the scene?

A: Be sure the Update Colors checkbox is set to true on your bone animations in the scene. This is set to false by default to improve processing on animations that do not need their color updated.

Figure 10-1 Update Colors



Q: If I cross fade two animations that switch textures, why do the animation textures change erratically?

A: When two animations are crossfading, they will both be firing their internal triggers to change textures at the same time. Because of this you may see the textures switch back and forth erratically. If you have a texture switch on either of the animations, then it would be best not to cross fade. Instead you could just use Play. To get a smoother transition between states, you could create animations that run between your two animation states.

Q: I call Play or CrossFade using the Animation component, but my textures are not switching, my colliders are not turning on / off, and the animation is playing at the wrong speed. What am I doing wrong?

A: Instead of calling your play functions through the Animation component, call them through the BoneAnimation component. The BoneAnimation component ensures the animations play at the right speed and handles the texture switching, collider changes, user triggers, and other events that happen throughout an animation.

Check out the demo files in the SmoothMoves package, read the API documentation, or view the video tutorials for examples of how to use the BoneAnimation component.

Q: How can I make a lower resolution animation

for older devices without having to create a whole new animation?

See the workflow at 8.3 Creating Assets for Older Devices / Multiple Resolutions

Q: Why do my animations and sprites have artifacts in them?

Depending on your atlas texture compression and the atlas padding, your animations may show bits of texture that should not be there, such as this:

Figure 10-2 Artifacts

You can fix this by either changing the compression level of the atlas texture or by increasing the padding of the atlas and rebuilding. You may also need to set the wrap mode to clamp so that pixels from one side of the atlas do not bleed into the opposite side.

Figure 10-3 Increase Quality

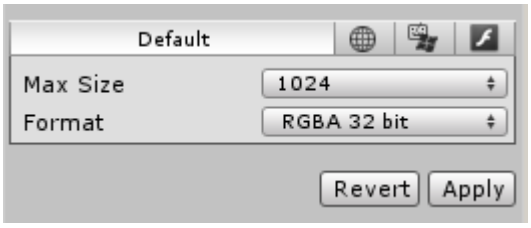
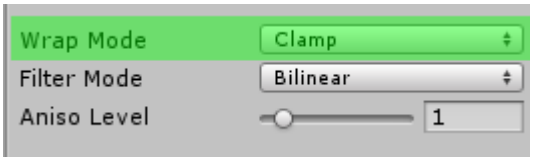


Figure 10-4 Increase Padding

Figure 10-5 Set clamp wrap mode



See Padding for more information on atlas padding.

Q: Why are my textures cut off in the texture atlas?

If you set the max atlas size too small in the atlas editor, Unity may cut off your textures in the final atlas. Unity does not resize the source textures, so its texture packer will just truncate your images. If you see this happening, you will need to increase the max atlas size in your atlas editor.

Figure 10-6 Max atlas size too low

Figure 10-7 Max texture size too low

Note that you can increase your max atlas size to a high value in the atlas editor, then resize down in the Unity inspector to get around this limitation.

Figure 10-8 Higher max atlas size

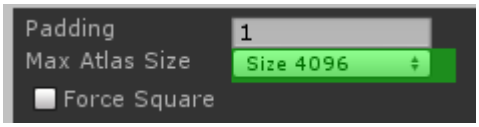
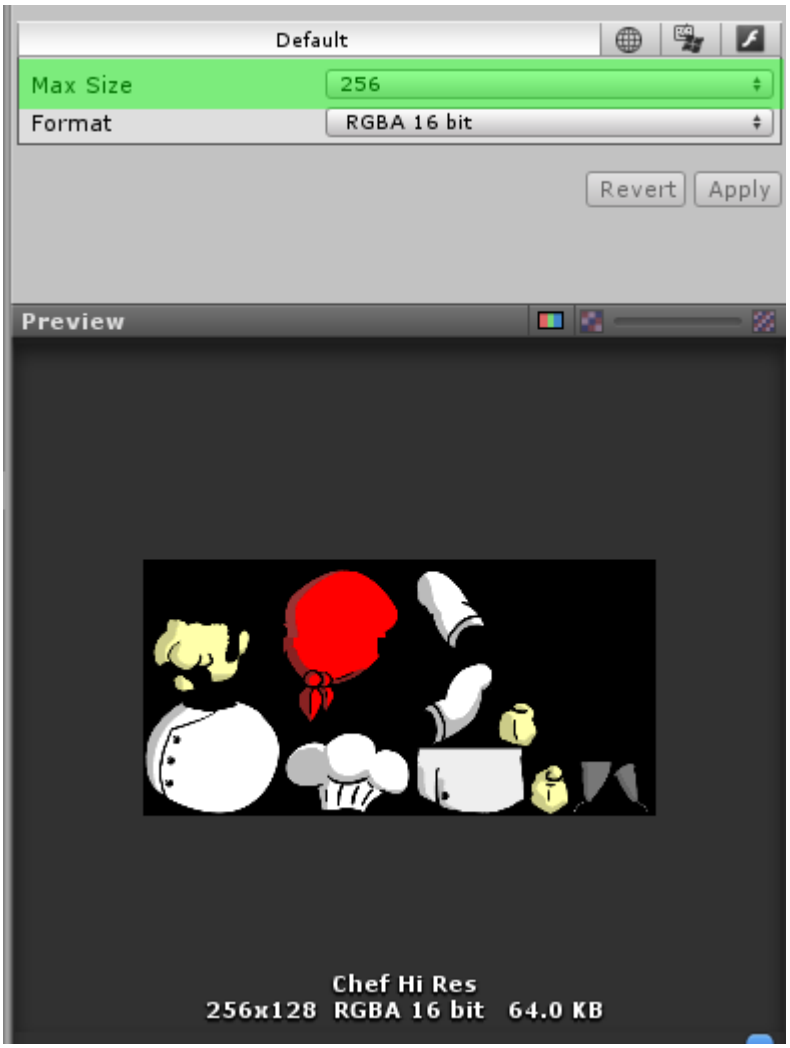


Figure 10-9 Set max size lower in inspector



11.

Guide Version History

2012.06.14.1

- Added Guide Version History.
- 8.2 Skinned Mesh Draw Calls - Added tip on how to improve draw call performance by keeping atlases near each other in depth.

2012.07.09.1

- Bone Visibility - Changed the bone visibility toggle to show the new deactivate bone feature.

2012.10.23.1

- Updated to reflect changes made in 2.0